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Burchardt, Otto. Beitrag zur Lehre von den Grenztumoren von Conjunctiva und Cornea. 1894

Cajal, S. Ramon. Die Retina der Wirbelthiere. Edited, with assistance of Author, by Richard Greeff. 1894

Carpenter, George. Tuberculosis of the Choroid. 1890

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Clinique Ophtalmologique. From commencement in 1895

Congress d'Ophtalmologie. 8th. Held in Edinburgh. 1894

Dimmer, Friedrich. Beiträge zur Anatomie und Physiologie der Macula des Menschen. 1894

Gendron, Louis. Traité des Maladies des Yeux. 2 vols. 1770

Graefe, Albrecht von. Erinnerungen an zu seinem 25sten Todestage. 1895

Greeff, Richard. Editor of *Cajal's* Retina der Wirbelthiere.

Haab, O. Atlas und Grundriss der Ophthalmoskopie. 1895

Helmholtz. Optique Physiologique. Traduite par Javal and Klein. 1867

Helmholtz, Hermann von. Gedächtnissrede gehalten in der Singakadamie zu Berlin von W. v. Bezold. 1895

Hippel, A. von. Ueber totale angeborene Farbenblindheit. 1894

Hirschberg. On the Cataract-Pricking of the Hindus. Translated by Surg.-Cap. Maynard. 1894

Javal and Klein. French Translation of *Helmholtz's* Physiological Optics. 1867

Johnson, G. Lindsay. On the Pupils of the Felidæ. 1894

Knies, Max. Relations of Diseases of the Eye to General Diseases. Translations from the German by Noyes. 1895

Koster, Dr. W. Beiträge zur Lehre dom Glaucom (A. f. O.). 1895

——— Beiträge zur Tonometrie und Manometrie des Augen (A. f. O.). 1895

Kries, J. von. Ueber den Einfluss der Adaptation auf Licht- und Farbenempfindung, und über die Funktion der Stäbcken. 1894

Loring, Ed. G. Text-book of Ophthalmoscopy. Part 2. Edited by F. B. Loring. 1891

Magnus, H. Augenärztliche Unterrichtstafeln.

Marti, Arnold. Ueber subconjunctivale Kochsalinjectionen bei destructiven Hornhautprocessen. 1895

Mauthner, L. Farbenlehre. Der "Functionsprüfung;" erster Theil. 2te Auflage. 1894

Möbius, T. J. Ueber verschiedene Augenmuskelstörungen (Neurologische Beiträge, iv). 1895

Molyneux, William. A Treatise of Optiks. 1709

Noyes. Translations of *Max Knies.* Die Beziehungen der Sehorgans, &c. 1895

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SWANZY. Handbook of Diseases of the Eye. 5th edit. 1894

SYM, William G. Statistics of the Blind in Scotland. 1894

TRANSACTIONS of the International Ophthalmological *Congress.*

WEBSTER, David. Report of One Hundred and Eighteen Cataract Extractions. 1895

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October, 1895.

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OPHTHALMOLOGICAL TRANSACTIONS

VOL. XV

TRANSACTIONS

OF THE

OPHTHALMOLOGICAL SOCIETY

OF THE

UNITED KINGDOM

VOL. XV

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1895

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OF THE

OPHTHALMOLOGICAL SOCIETY

OF THE

UNITED KINGDOM

VOL. XV

SESSION 1894-5

WITH

LIST OF OFFICERS, MEMBERS, ETC.

LONDON
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The present volume comprises the proceedings of the Ophthalmological Society of the United Kingdom during its Fifteenth Session, October, 1894, to July, 1895.

The Society does not hold itself responsible for the statements, reasonings, or opinions expressed in the communications which the Council has deemed suitable for publication.

11, Chandos Street,
Cavendish Square, W.

TABLE OF CONTENTS

OF VOLUME XV.

	PAGE
Officers and Council	IX
List of Presidents	X
List of Members	XI
Rules	XXXV
List of Communications made during the Session 1894–5	XLI
List of Plates	XLVII
List of Woodcuts	XLVIII
Bowman Lecture	1
Diseases of the Eyelids	39
Diseases of the Conjunctiva	51
Diseases of the Cornea	69
Diseases of the Iris and Ciliary Body	93
Diseases and Injuries of the Lens	104
Diseases of the Retina and Choroid	124
Diseases of the Optic Nerve	127
Parasitic Diseases	137
Intra-ocular Growths	178
Diseases of the Orbit	185
Congenital Abnormalities	192
Miscellaneous	199
Instruments	249
Appendix	254
Report of Council	255
Index	259

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ELECTED

O.M. *Abercrombie, John, M.D., Physician to the Charing Cross Hospital, and Assistant Physician to the Hospital for Sick Children, Great Ormond Street; 23, Upper Wimpole Street, W. (S. 1882-5. C. 1885-8.)

O.M. Adams, M. A. (C.), Surgeon to the Kent County Ophthalmic Hospital, Trinity House, Maidstone.

1884 †Allison, H., M.D., care of Messrs. Binny and Co., Madras, India.

‡ [Elected July, 1895. Deceased Aug., 1895.]

ELECTED

1887 *Anderson, Tempest, M.D., Ophthalmic Surgeon to the York County Hospital; 17, Stone-gate, York.

1883 Andrews, A. G., Carlton House, Moss Lane East, Manchester.

O.M. Archer, T. Brittin, Senior Surgeon to the Central London Ophthalmic Hospital; Ophthalmic Surgeon to St. Monica's Home Hospital, Brondesbury Park; 29, Nottingham Place, W.

1891 †Armstrong, Hugh, Hobart, Tasmania.

1895 Attlee, John, M.B., 58, Brook Street, W.

1892 Atwool, William Tillinghast, Ophthalmic Surgeon to the Torbay Hospital, Torquay; 1, Portland Place, Torquay.

O.M. Bankart, James, M.B., Surgeon to the Devon and Exeter Hospital, and to the West of England Eye Infirmary; 19, Southernhay, Exeter. (V.-P.1890-93.)

O.M. *Barlow, Thomas, M.D. (V.-P.), Physician to, and Assistant Professor of Clinical Medicine at, University College Hospital; Physician to the Hospital for Sick Children, Great Ormond Street; 10, Wimpole Street, W. (C. 1880-81.)

1889 †Barrett, James W., M.D., 34, Collins Street East, Melbourne, Australia.

1883 Barton, J. Kingston, 2, Courtfield Road, Gloucester Road, S.W.

1892 Bass, Frederick, 9, Upper Wimpole Street, W.

1892 Batten, Rayner D., M.D., Assistant Surgeon to the Western Ophthalmic Hospital; Campden Lodge, Campden Hill Road, W.

1888 *Beaumont, W. M., Surgeon to the Bath Eye Infirmary; 4, Gay Street, Bath.

O.M. *Beevor, C. E., M.D. (C.), Physician to the National Hospital for the Paralysed and Epileptic, and to the Great Northern Central Hospital; 33, Harley Street, W. (S. 1891-4.)

ELECTED

1891 †Bennett, Alfred H., Kapunda, South Australia.

O.M. Benson, A. H., M.D., Junior Surgeon to St. Mark's Ophthalmic Hospital, Ophthalmic Surgeon to the City of Dublin Hospital, and Examiner in Ophthalmic Surgery to the Royal College of Surgeons of Ireland; 42, Fitzwilliam Square, Dublin. (C. 1888-91.)

O.M. Berry, G. A., M.D. (V.-P.), Ophthalmic Surgeon, Royal Infirmary, and Lecturer on Ophthalmology Royal College of Surgeons, Edinburgh; 31, Drumsheugh Gardens, Edinburgh. (C. 1889-92.)

1881 Bickerton, T. H. (C.), Oculist to the Liverpool Royal Infirmary; 88, Rodney Street, Liverpool.

1892 Black, John Wilson, 46, Academy Street, Inverness.

1891 Black, Urquhart, M.B., 32, Weymouth Street, Portland Place, W.

1885 Blumer, W. P., Honorary Surgeon to the Sunderland and North Durham Eye Infirmary; Rydal House, Sunderland.

1890 Bokenham, T. J., 10, Devonshire Street, Portland Place, W.

1885 Bower, Ernest Dykes, Surgeon and Ophthalmic Surgeon to the Gloucester General Infirmary; Elton House, Gloucester.

1893 Bowerman, Albert Claude, M.B., Picton, Ontario, Canada.

O.M. Brailey, W. A., M.D., Ophthalmic Assistant Surgeon to Guy's Hospital; Ophthalmic Surgeon to the Evelina Hospital for Children; 11, Old Burlington Street, W. (S. 1883-6. C. 1880-3, 1886-9.)

1891 Bristowe, Hubert Carpenter, M.D., 13, Old Burlington Street, W.

1886 Bronner, Adolph, M.D., Surgeon to the Bradford Eye and Ear Hospital; 33, Manor Row, Bradford.

O.M. Browne, Edgar A. (V.-P.), Senior Surgeon to the Liverpool Eye and Ear Infirmary; 39, Rodney Street, Liverpool. (C. 1887-90.)

ELECTED

1895 Browne, J. W., M.D., 10, College Square North, Belfast.

1893 †Bull, G. J., M.D., 4, Rue de la Paix, Paris.

1889 Bullar, John F., M.B., 7, Carlton Crescent, Southampton.

1883 †Buller, Frank, M.D., 838, Dorchester Street, Montreal, Canada.

O.M. †Burnham, G. H., M.B., 157, Simcoe Street, Toronto, Canada.

O.M. Buzzard, Thomas, M.D., Physician to the National Hospital for the Paralysed and Epileptic; 74, Grosvenor Street, W. (V.-P. 1888-91. C. 1881-2.)

1892 Caiger, Herbert, M.B., Jacobsdal, Orange Free State.

1891 Campbell, E. Kenneth, Surgeon to the Western Ophthalmic Hospital, 53, Lincoln's-Inn Fields, W.C.

1887 Cant, W. E., M.D., British Ophthalmic Hospital, Jerusalem, Palestine.

1882 *Cant, W. J., Surgeon to the Lincoln County Hospital 3, Lindum Road, Lincoln.

1891 Cargill, L. Vernon, Royal Eye Hospital, Southwark, S.E.

1889 Carless, Albert, M.B., M.S., 10, Welbeck Street, W.

1888 Carter, Rowland W., M.D., Surgeon to the Weymouth and Dorset County Royal Eye Infirmary; 13, Gloucester Row, Weymouth, Dorset.

1895 Cartwright, E. H., M.D., 1, Courtfield Gardens, S.W.

1888 Channer, O. H., M.B., Surgeon-Major and Deputy Sanitary Commissioner; Belgaum, Bombay.

O.M. Charnley, William, M.D., Surgeon to the Shropshire Eye, Ear and Throat Hospital; Hardwick House, St. John's Hill, Shrewsbury.

1885 Chesshire, Arthur Edwin, 55, Darlington Street, Wolverhampton.

ELECTED

1885 Clarke, Ernest, M.D., B.S. (C.), Surgeon to the Central London Ophthalmic Hospital, and Ophthalmic Surgeon to the Miller Hospital; 3, Chandos Street, Cavendish Square, W.

1885 Collins, E. Treacher, late Curator and Librarian to the Royal London Ophthalmic Hospital, Moorfields; 84, Wimpole Street, Cavendish Square, W. (C. 1889-92.)

1886 Collins, W. J., M.S., M.D., B.Sc., Surgeon to the London Temperance Hospital, Ophthalmic Surgeon to the North-West London Hospital, and Assistant Surgeon to the Royal Eye Hospital, Southwark; 1, Albert Terrace, Gloucester Gate, Regent's Park, N.W.

1894 †Coote, Patrick, M.D., 73, St. Ann Street, Quebec, Canada.

1884 Coulter, William, M.D., 2/2, Harrington Street, Calcutta.

O.M. Couper, John (V.-P.), Consulting Surgeon to the London Hospital, and Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 80, Grosvenor Street, W. (C. 1881-2.)

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O.M. Critchett, G. Anderson (V.-P.), Ophthalmic Surgeon to, and Lecturer on Ophthalmic Surgery at, St. Mary's Hospital; 21, Harley Street, W. (C. 1883-6.)

ELECTED

1881 Cross, F. R., Ophthalmic Surgeon to the Bristol Royal Infirmary; Surgeon to the Bristol Eye Infirmary; Ophthalmic Surgeon to the Bristol Dispensary; Worcester House, Clifton, Bristol. (C. 1891-4.)

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1881 Dixon, W. E., Bridge Cot, Oulton Broad, Lowestoft.

1889 Dodd, Henry Work, Assistant Surgeon to Royal Westminster Ophthalmic Hospital and the Royal Free Hospital, Ophthalmic Surgeon to the West End Hospital for Nervous Diseases; 136, Harley Street, W.

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1890 Donaldson, Eben., 49, Great James Street, Londonderry.

1890 Douty, Edward Henry, M.B., B.C., 69, Bridge Street, Cambridge.

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1881 *Drake-Brockman, E. F. (C.), late Professor of Physiology and Diseases of the Eye at the Medical College, Madras; 14, Welbeck Street, Cavendish Square, W.

1889 †Drake-Brockman, Herbert E., Mirzapur, India.

1895 Du Boulay, H. H., 2, Royal Terrace, Weymouth.

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ELECTED

1886 Dunn, Hugh Percy, Assistant Ophthalmic Surgeon to the West London Hospital; 54, Wimpole Street, Cavendish Square, W.

O.M. Eales, Henry, Surgeon to the Birmingham and Midland Eye Hospital; 7, Newhall Street, Birmingham. (C. 1890-3.)

O.M. *Edmunds, Walter, M.D., Medical Officer, St. Thomas's Home; 75, Lambeth Palace Road, Albert Embankment, S.E. (C. 1885-8.)

1883 *Emrys-Jones, A., M.D., Surgeon to the Royal Eye Hospital; 10, St. John Street, Manchester.

1887 Ensor, Henry C., Ophthalmic and Aural Surgeon to the Cardiff Eye and Ear Hospital; 23, Windsor Place, Cardiff.

1891 Eve, Frederic S., Assistant Surgeon to the London Hospital; 125, Harley Street, W.

1891 †Evill, T. Claude, Broken Hill, New South Wales.

1888 Fergus, A. Freeland, M.B., Ophthalmic Surgeon to the Royal Infirmary, Glasgow; Surgeon and Lecturer on Ophthalmology to the Glasgow Eye Infirmary; 203, Bath Street, Glasgow.

1888 †Ferguson, Alex. F., M.D., care of Messrs. Grindlay, Groom & Co., Bombay.

O.M. †Ferguson, H. L., Ophthalmic Surgeon to the Dunedin Hospital; Lecturer on Ophthalmology, Otago University; Dunedin, New Zealand.

1890 Ferguson, R. Bruce, M.D., B.C., 26, Woodland Road, New Southgate, N.

1889 Ferrier, David, M.D., F.R.S., Physician to King's College Hospital and to the National Hospital for the Paralysed and Epileptic; 34, Cavendish Square, W.

1894 Fischer, E. C., M.B., Royal London Ophthalmic Hospital, Moorfields, E.C.

1895 Fisher, J. H., M.B., St. Thomas's Hospital, S.E.

ELECTED

O.M. Fitzgerald, C. E., M.D., Surgeon to the National Eye and Ear Infirmary; Lecturer on Ophthalmic Surgery, Carmichael School of Medicine; 27, Upper Merrion Street, Dublin. (V.P. 1882-5. C. 1880-1.)

O.M. Fitz-Gerald, W. A., M.D., Monte Carlo, Monaco.

1889 Flemming, Percy, M.D., 93, Gower Street, W.C.

1891 Foggin, George, 63, Westmoreland Road, Newcastle-on-Tyne.

1892 Folker, Herbert Henry, 11, Havelock Place, Stoke-on-Trent.

1886 Ford, A. Vernon, Surgeon to the Portsmouth and South Hants Eye and Ear Infirmary; 14, High Street, Portsmouth.

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O.M. Frost, W. Adams (L.), Ophthalmic Surgeon to St. George's Hospital; Surgeon to the Royal Westminster Ophthalmic Hospital; 17, Queen Anne Street, Cavendish Square, W.

1883 †Da Gama, Jerminio Accacio, Khoja Moola, Bombay.

1895 Galloway, A. R., M.B., 207, Union Street, Aberdeen, N.B.

1890 Galloway, James, M.D., C.M., Physician for Out-patients to the Great Northern Central Hospital; 21, Queen Anne Street, Cavendish Square, W.

1887 †Gardner, John J., M.D., Senior Ophthalmic and Aural Surgeon to the Montreal General Hospital, 12, Phillip's Place, Montreal, Canada.

1889 Gibbs, Alfred N. G., Assistant Surgeon to the Bristol Eye Hospital; 52, Whiteladies Road, Clifton.

O.M. Glascott, C. E., M.D., Surgeon to the Manchester Royal Eye Hospital; 23, St. John Street, Manchester.

1885 †Godfray, Alfred Charles, St. Helier's House, St. Helier's, Jersey.

ELECTED

O.M. Gowers, W. R., M.D., F.R.S., Physician to the National Hospital for the Paralysed and Epileptic; 50, Queen Anne Street, W. (C. 1880-3.)

1895 †Grant, H. Y., M.D., 414, Delaware Avenue, Buffalo, U.S.

1888 Grant, Ogilvie, M.B., Queen Mary's House, Inverness

1895 †Gray, James, M.D., 119, Robert Street, Toronto, Canada.

1887 Green, Edwin Collier, Ophthalmic Surgeon to the Derbyshire General Infirmary; 27, Friar Gate, Derby.

O.M. Greenfield, W. S., M.D., Professor of Pathology University of Edinburgh; Heriot Row, Edinburgh.

1895 Griffin, W. W., M.B., 32, New Cavendish Street, W.

1885 *Griffith, A. Hill, M.D. (C.), Surgeon to the Royal Eye Hospital, Manchester; 17, St. John Street, Manchester.

1895 Griffith, D. C. B., "Huntworth," Bedford.

1890 Griffith, John, Assistant Surgeon and Pathologist to the Royal Westminster Ophthalmic Hospital; 7, Grafton Road, Acton.

1894 Grimsdale, Harold, M.B., St. George's Hospital.

O.M. Grossmann, K. A., Ophthalmic Surgeon Stanley Hospital, Liverpool; 70, Rodney Street, Liverpool.

1889 Gunn, Donald S., Ophthalmic Surgeon to the Seamen's Hospital, Greenwich, and to the Hospital for Sick Children, Great Ormond Street; Assistant Surgeon to the Westminster Ophthalmic Hospital; 66, Wimpole Street, W.

O.M. Gunn, R. Marcus, Surgeon to the Royal London Ophthalmic Hospital, Moorfields; Assistant Ophthalmic Surgeon to University College Hospital; Ophthalmic Surgeon to the National Hospital for the Paralysed and Epileptic; 54, Queen Anne Street, W. (C. 1882-5, 1889-92. S. 1886-9.)

1887 Habershon, Samuel Herbert, M.D. (S.), Assistant Physician to the Brompton Hospital for Consumption and Diseases of the Chest; 70, Brook Street, Grosvenor Square, W.

ELECTED

1889 Hailes, C.D.G., M.D., Assistant Surgeon, Bristol Eye Hospital; Consulting Surgeon-Oculist, Redland Br., Clifton Dispensary; 9, King's Parade, Clifton, Bristol.

1885 †Haines, Humphrey, Auckland, New Zealand.

1878 †Hamilton, T. K., M.D., Wakefield Street, Adelaide, South Australia.

1886 Hartley, Robert N., M.B., Assistant Surgeon to the Leeds General Infirmary, 38, Cookridge Street, Leeds.

1882 *Hartridge, Gustavus (C.), Consulting Ophthalmic Surgeon to St. Bartholomew's Hospital, Chatham; Surgeon to the Royal Westminster Ophthalmic Hospital, and Ophthalmic Assistant Surgeon and Lecturer on Ophthalmic Surgery to the Westminster Hospital; 65, Green Street, Grosvenor Square, W. (C. 1889-92. S. 1892-5.)

1892 Haydon, Frank, Surgeon to the Western Ophthalmic Hospital; 55a, Welbeck Street, Cavendish Square, W.

1889 Helm, George F., M.D., Ophthalmic Surgeon to Truro Royal Infirmary; Marazion, Cornwall.

1887 Hern, John, M.D., Ophthalmic Surgeon and Surgeon to the Darlington Hospital; Semmercote, Darlington.

1883 Hewetson, H. B., Ophthalmic and Aural Surgeon, Leeds General Infirmary; 11, Hanover Square, Leeds.

1895 Hickman, H. R. Belcher, M.B., 5, Harley Street, W.

O.M. Higgens, Charles, Ophthalmic Surgeon to, and Lecturer on Ophthalmology at, Guy's Hospital; 38, Brook Street, W. (C. 1880-3.)

1888 Hinnell, J. S., M.B., 62, Garland Street, Bury St. Edmund's.

1886 †Hodge, Rev. Sydney Rupert, M.R.C.S., Wesleyan Mission House, Hankow, China.

1889 Holthouse, Edwin H., M.B., Surgeon to the Western Ophthalmic Hospital; 45, Weymouth Street, W.

ELECTED

1885 †Howard, R. J. B., M.D., 31, Queen Anne Street, W.

1893 †Howe, Lucien, 183, Delaware Avenue, Buffalo.

1884 †Hudson, Ernest (care of Messrs. King, King & Co. Jamsund Lane, Bombay).

1889 †Hughes, Samuel H., Gingola, Mowbray Road, Willoughby, Sydney, New South Wales.

1893 Hughes, Wilfrid Kent, M.B., 102, Collins Street, Melbourne.

O.M. Hutchinson, Jonathan, F.R.S Consulting Surgeon to the London Hospital, and to the Royal London Ophthalmic Hospital; 15, Cavendish Square, W. (*Pres.* 1883-6. V.-P. 1880-1, 1886-9.)

1883 †Jackson, James, M.D., Collins Street East, Melbourne, Australia.

O.M. Jackson, J. Hughlings, M.D., F.R.S., Physician to the London Hospital, and to the National Hospital for the Paralysed and Epileptic; 3, Manchester Square, W. (*Pres.* 1889-90. V.-P. 1880-2, 1890-3.)

1888 James, J. T., Assistant Surgeon to the Central London Ophthalmic Hospital; 30, Harley Street, W.

O.M. Jeaffreson, C. S., Surgeon to the Newcastle-on-Tyne Eye Infirmary; 24, Eldon Square, Newcastle-on-Tyne.

1883 †Jenkins, E. J., M.D., Nepean Towers, Douglass Park, Sydney, N.S.W., Australia.

1883 Jessop, W. H. H., Ophthalmic Surgeon to St. Bartholomew's Hospital, and to the Paddington Green Children's Hospital; 73, Harley Street, W. (C. 1889-92.)

1882 Johnson, G. L., M.B., Cortina, Netherhall Gardens, South Hampstead.

1888 †Johnston, Geo. D., Vancouver City, British Columbia, Canada.

ELECTED

1889 Johnston, Robt. K., M.D., Ophthalmic and Aural Surgeon to Steeven's Hospital; Junior Assistant Surgeon to the National Eye and Ear Infirmary; 22, Lower Baggot Street, Dublin.

O.M. Jones, Evan, Ty-mawr, Aberdare, Glamorganshire.

O.M. Jones, H. Macnaughton, M.D., 141, Harley Street, W.

1894 †Jones, R. H., M.B., B.S., 209, Macquarie Street, Sydney, New South Wales.

O.M. Juler, H. E., Ophthalmic Surgeon to St. Mary's Hospital; Surgeon, Royal Westminster Ophthalmic Hospital; 23, Cavendish Square, W. (C. 1886-9.)

1888 †Kenny, Augustus Leo, M.B., Collins Street, Melbourne, Victoria, Australia.

1890 Keogh, Alfred H., Surgeon-Major, M.D., M.Ch., North Station Hospital, Bangalore, Madras.

1891 Kingdon, E. C., M.B., C.M., 4, Upper College Street, Nottingham.

1881 †Knaggs, S. T., M.D., Lecturer on Clinical Surgery University of Sydney; Hon. Surgeon Prince Alfred Hospital, Sydney; Staff Surgeon N.S.W. Naval Forces, and Member N.S.W. Board of Health; 16, College Street, Hyde Park, Sydney, New South Wales.

O.M. Lang, William, Ophthalmic Surgeon to the Middlesex Hospital; Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 22, Cavendish Square, W. (C. 1886-9.)

1881 Langdon, J. Winkley, Ophthalmic Surgeon to Preston and County of Lancaster Royal Infirmary; 4, Winkley Square, Preston.

O.M. Lawford, J. B. (S.), Ophthalmic Surgeon to and Lecturer on Ophthalmology at, St. Thomas's Hospital; Assistant Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 55, Queen Anne Street, W. (C. 1886-9.)

1889 *Laws, Wm. G., M.B., Holmlea, Sherwood Rise, Nottingham.

ELECTED

O.M. Lawson, George, Consulting Surgeon to the Royal London Ophthalmic Hospital, and Surgeon to the Middlesex Hospital; 12, Harley Street, Cavendish Square, W. (C. 1882-4. V.P. 1892-5.)

1895 †Lea, J. Augustus, M.B, Royal Colonial Institute, Northumberland Avenue, W.C.

1893 Leahy, Surg.-Major A. W. D., M.D., Indian Medical Service, 6, Elysium Row, Calcutta.

1885 †Le Cronier, Hardwick, St. Helier's, Jersey.

O.M. Lediard, H. A., M.D., Surgeon to the Cumberland Infirmary; 35, Lowther Street, Carlisle.

1885 Lee, Charles G., Surgeon to the Eye and Ear Infirmary, Liverpool; 73, Rodney Street, Liverpool.

O.M. Little, David, M.D., Surgeon to the Royal Eye Hospital, Manchester; Ophthalmic Surgeon, Royal Infirmary; Lecturer on Ophthalmology, Owens College, Manchester; 21, St. John Street, Manchester. (V.-P. 1888-91. C. 1880-1.)

1892 Lodge, Samuel, Jun., M.D., Special Assistant Surgeon to the Bradford Eye and Ear Hospital; 13, Manningham Lane, Bradford.

1883 Lunn, J. R., Resident Medical Officer, Marylebone Infirmary, Notting Hill, W. (C. 1892-5.)

1892 Macarthur, Robert F., M.B., Glasgow Eye Infirmary; Berkeley Street West, Glasgow.

1888 Mackay, George, M.D., Ophthalmic Surgeon to the Royal Infirmary and to the Eye Dispensary of Edinburgh; Lecturer on Practical Ophthalmoscopy; 2, Randolph Place, Edinburgh.

O.M. Mackenzie, F. M., 29, Hans Place, S.W.

1889 †Mackenzie, F. Wallace, M.B., 139, Upper Willis Street, Wellington, New Zealand.

O.M. Mackenzie, Stephen, M.D. (V.-P.), Physician to, and Lecturer on Medicine at, the London Hospital; Physician to the Royal London Ophthalmic Hospital, Moorfields; 18, Cavendish Square, W. (S. 1880-2. C. 1882-5.)

ELECTED

O.M. Mackinlay, J. G., Ophthalmic Surgeon to the Royal Free Hospital, and Surgeon to the South London Ophthalmic Hospital; 15, Stratford Place, W. (C. 1888-90.)

1889 MacLehose, Norman M., M.B., Assistant Surgeon to the Central London Ophthalmic Hospital; 13, Queen Anne Street, Cavendish Square, W.

1892 †MacLeod, Charles G., M.B., 26, College Street, Hyde Park, Sydney, N.S.W.

1881 †Maconachie, G. A., M.D., Grant Medical College, Bombay.

1883 †Maher, W. O., M.D., Surgeon to St. Vincent's Hospital; Ophthalmic Surgeon to the Sydney Hospital; Ophthalmic Surgeon to the Government Asylums at Parramatta and Liverpool; 20, College Street, Hyde Park, Sydney, N.S.W.

1883 †Marlow, Frank William, 401, Montgomery Street, Syracuse, New York State, U.S.A.

1892 Marshall, Charles Devereux, 105, Gower Street, W.C.

1888 †Martin, Albert, M.D., Wellington, New Zealand.

1884 Maxwell, Patrick William, M.D., Ophthalmic Surgeon, Jervis Street Hospital, and Assistant Surgeon, National Eye and Ear Infirmary, Dublin; 19, Lower Baggot Street, Dublin.

1893 Maynard, Frederic Pinsent, Surgeon-Captain, M.B., Indian Medical Service, care of Grindlay Co., Calcutta.

1890 McGillivray, Angus, M.B., Surgeon to the Dundee Eye Institution; Ophthalmic Surgeon, Dundee Royal Infirmary; Lecturer on Ophthalmology, University College, Dundee; 13, Airlie Place, Dundee, N.B.

O.M. McHardy, M. M., Ophthalmic Surgeon to King's College Hospital; Professor of Ophthalmology, King's College; Surgeon Royal South London Ophthalmic Hospital; Ophthalmic Surgeon to St. John's Hospital; 5, Savile Row, W. (C. 1887-90.)

ELECTED

1895 †McIntosh, J. R., M.D., West End, St. John, New Brunswick, Canada.

1895 McKenzie, H. V., M.D., Junior House Surgeon, Royal London Ophthalmic Hospital, Moorfields.

1884 McKeown, David, M.D., 25, St. John Street, Manchester.

1884 McKeown, W. A., M.D., 20, College Square East, Belfast.

O.M. Meighan, T. S., M.D., Surgeon to the Glasgow Eye Infirmary, and Lecturer on Ophthalmic Surgery, Anderson's College Medical School; 15, Elmbank Street, Glasgow.

1881 †Milles, W. Jennings, care of Drs. Henderson and Macleod, Shanghai, China.

1887 Morgan, William Lewis, Surgeon to the Radcliffe Infirmary, Oxford; 37, Broad Street, Oxford.

O.M. Morton, A. Stanford, Assistant Surgeon to the Royal London Ophthalmic Hospital, Moorfields; Ophthalmic Surgeon to the Great Northern Central Hospital; 133, Harley Street, W. (C. 1886-9.)

1891 Mossop, Arthur George, Newhaven, Sussex.

1890 Mowat, Daniel, M.D., Holmwood, 45, Stamford Hill, N.

O.M. Mules, P. H., M.D., Surgeon to the Royal Eye Hospital, Manchester; The Hall, Whaley Bridge, Cheshire. (C. 1886-9.)

1891 Myddelton-Gavey, Edward Herbert, 94, Wimpole Street, W.

1893 Napier, F. H., M.B., B.S., Ophthalmic Surgeon, Royal Infirmary; Surgeon to the Ophthalmic Institution and Professor of Ophthalmology to St. Mungo's College, Glasgow; 18, Brandon Place, Glasgow.

O.M. *Nelson, Joseph, M.D. (C.), Ophthalmic Surgeon to Royal Hospital and to Queen Street Children's Hospital, Belfast; 29, Wellington Place, Belfast.

ELECTED

O.M. *Nettleship, Edward (*Pres.*), Ophthalmic Surgeon to St. Thomas's Hospital; Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 5, Wimpole Street, W. (S. 1880-3. C. 1883-6. V.-P. 1886-9.)

1881 Nicholson, A., Surgeon to the Sussex and Brighton Infirmary for Diseases of the Eye; 30, Brunswick Square, Brighton.

1895 Ogilvie, F. M., M.B., 5, Evelyn Mansions, Victoria Street, S.W.

1895 Ogilvy, Alexander, M.B., Bristol Eye Hospital.

1889 †O'Kinealy, Frederick, Indian Medical Service, 11, Elysium Row, Calcutta.

1884 Oldham, Charles J., 1, Brunswick Place, Brighton.

O.M. Ord, W. M., M.D., Physician to, and Lecturer on Medicine at, St. Thomas's Hospital; 37, Upper Brook Street, W. (T. 1886-91. V.-P. 1891-4.)

1881 Ormerod, J. A., M.D., Physician to the National Hospital for the Paralysed and Epileptic; Assistant Physician to St. Bartholomew's Hospital; 25, Upper Wimpole Street, W. (C. 1891-4.)

1892 †Orr, Andrew William, M.D., South Stoke, Bath.

1890 †Osborne, A. B., M.D., 46, McNab Street South, Hamilton, Canada.

O.M. Owen, D. C. Lloyd, Surgeon to the Birmingham and Midland Eye Hospital; 51, Newhall Street, Birmingham. (V.-P. 1891-4.)

O.M. Page, Herbert W., Surgeon to St. Mary's Hospital; 146, Harley Street, W. (C. 1890-3.)

1890 †Palmer, L. Loran, M.D., 42, St. George Street, Toronto, Ontario, Canada.

1894 *Parker, Herbert, Assistant Surgeon to the Central London Ophthalmic Hospital; 7, Bloomsbury Place, W.C.

1893 Part, J. Shepley, 26, Ashchurch Park Villas, W.

1887 †Patell, D. H., 12, Ragoonatti Dadagi Street, Fort, Bombay.

ELECTED

O.M. PENFOLD, HENRY, Consulting Surgeon to the Sussex Eye Hospital; 7, Brunswick Place, Brighton.

1891 PERRY, A., Surgeon-Captain; care of Senior Medical Officer, 2, Flagstaffe Street, Colombo, Ceylon.

1889 †PERRY, FRANCIS F., Professor of Ophthalmic Surgery, Lahore Medical College, Punjab, India.

1888 PERCIVAL, ARCHIBALD STANLEY, M.B., B.Ch., Ophthalmic Surgeon to the Children's Hospital, Newcastle-on-Tyne; 16, Ellison Place, Newcastle-on-Tyne.

1889 PHILLIPS, T., 94, Wimpole Street, Cavendish Square, W.

1895 PICKARD, RANSOM, M.D., 31, East Southernhay, Exeter.

1895 POOLEY, G. H., The Eye Hospital, Oxford.

1894 †POPE, R. J., M.D., Box 497, G.P.O., Sydney, N.S.W.

O.M. POWER, HENRY (V.-P.), Consulting Ophthalmic Surgeon to St. Bartholomew's Hospital; Consulting Surgeon to the Westminster Ophthalmic Hospital; 37A, Great Cumberland Place, W. (*Pres.* 1890-3. V.-P. 1882-5. C. 1880-2.)

1888 PRICE, JOHN A. P., M.D., Assistant Surgeon to the Royal Berkshire Hospital; 124, Castle Street, Reading.

1882 PRICHARD, ARTHUR WILLIAM, Surgeon to the Bristol Royal Infirmary, to the Bristol Eye Dispensary, and to the Bristol Asylum for the Blind; 6, Rodney Place, Clifton.

O.M. PRICHARD, AUGUSTIN, Consulting Surgeon to the Bristol Royal Infirmary and Eye Dispensary; 4, Chesterfield Place, Clifton. (V.-P. 1881-4.)

1892 PRONGER, CHARLES ERNEST, 1, Grosvenor Terrace, Harrogate.

O.M. PURVES, W. LAIDLAW, Aural Surgeon to Guy's Hospital; Ophthalmic and Aural Surgeon to the Hospital for Paralysis and Epilepsy; 20, Stratford Place, Oxford Street, W.

1888 RAINY, ADAM R., M.B., 6, Upper Wimpole Street, W.

1889 RAMSAY, A. MAITLAND, M.B., Surgeon to the Glasgow Eye Infirmary; 15, Woodside Place, Glasgow.

ELECTED

1881 †Reeve, R. A., M.D., Surgeon to the Toronto General Hospital, and to the Mercer Eye and Ear Infirmary; 22, Shuter Street, Toronto, Canada.

O.M. Reid, Thomas, M.D., Surgeon to the Glasgow Eye Infirmary, and Lecturer on Ophthalmic Medicine, University of Glasgow; 11, Elmbank Street, Glasgow. (V.-P. 1884-7.)

1885 Renton, James Crawford, M.D., 1, Woodside Terrace, Glasgow.

1891 Reynolds, Austin Edward, 81, Hornsey Rise, N.

1892 Ridley, Nicholas C., M.B., R.N., 27, Horse Fair Street, Leicester.

1885 Roberts, Edward, 12, St. John Street, Deansgate, Manchester.

O.M. *Robertson, D. Argyll, M.D. (C.), Ophthalmic Surgeon to the Edinburgh Royal Infirmary; Surgeon-Oculist in Ordinary to the Queen in Scotland; 18, Charlotte Square, Edinburgh. (*Pres.* 1893-95. V.-P. 1881-2, 1886-9.)

1891 Robertson-Fullarton, Archibald Louis, M.B., C.M., 201, Bath Street, Glasgow.

O.M. Rockliffe, W. C., M.D., Ophthalmic Surgeon to the Hull Royal Infirmary; 17, Charlotte Street, Hull. (C. 1892-5.)

1890 Rolston, John R., Ophthalmic Surgeon to the Royal Albert Hospital and Eye Infirmary, Devonport; 5, St. Aubyn Street, Devonport.

1891 Roper, Arthur Charles, The Shrubbery, Exeter.

1893 Ross, J. A., 11, Gordon Street, W.C.

1882 †Roth, Reuter E., 42, College Street, Hyde Park, Sydney, New South Wales.

1893 Rowan, John, M.B., 50, Eldon Street, Greenock, N.B.

1881 †Rudall, J. T., Surgeon to the Alfred Hospital and the Victorian Institute for the Blind, and Consulting Surgeon to the Melbourne Hospital; 61, Spring Street, Melbourne, Australia.

ELECTED

1895 Russell, J. S. Risien, M.D., Assistant Physician to the Metropolitan Hospital; 4, Queen Anne Street, Cavendish Square, W.

1889 Ruttle, Robert, Myrtle House, Accrington, Lancashire.

1888 †Sanders, Richard C., M.D., 36, Chowringhee, Calcutta.

1884 *Sandford, Arthur W., M.D., Surgeon to the Cork Eye, Ear, and Throat Hospital; Lecturer on Ophthalmology and Otology, Queen's College, Cork; 13, St. Patrick's Place, Cork.

1881 *Sansom, A. E., M.D. (C.), Physician to the London Hospital; Physician to the North-Eastern Hospital for Children; 84, Harley Street, W.

O.M. Savage, G. H., M.D., Lecturer on Mental Diseases at Guy's Hospital; 3, Henrietta Street, Cavendish Square, W. (C. 1892-4.)

1891 Schorstein, Gustave, M.D., Assistant Physician to the London Hospital; 11, Portland Place.

1888 Scott, Kenneth M., M.B., Clinical Lecturer in Ophthalmology, Egyptian Government Medical School; Ophthalmic Surgeon to the Kasr-el-Aini Hospital, Egypt; Sharia-el-Manakh, Cairo, Egypt.

1892 Shannon, John Rowlands, M.D., Assistant Surgeon to the Manhattan Eye and Ear Infirmary, 46, East 31st Street, New York.

O.M. Sharkey, S. J., M.D., Physician, and Joint Lecturer on Medicine, St. Thomas's Hospital; 22, Harley Street, W. (S. 1885-8. C. 1888-91.)

1894 Shaw, Cecil E., M.D., 14, College Square East, Belfast.

1883 Shears, Charles, Surgeon to the Liverpool Eye and Ear Infirmary; 19, Upper Duke Street, Rodney Street, Liverpool.

1892 †Sheppard, Arthur Murray, M.B., 2, Temple Gardens, E.C.

1883 Silcock, A. Q., Surgeon to St. Mary's Hospital and to the Royal London Ophthalmic Hospital; 52, Harley Street, W. (S. 1889-92. C. 1892-5.)

1893 Simpson, R. J. S., M.B., Royal Arsenal, Woolwich.

ELECTED

1891 Sinclair, Walter William, 48, High Street, Ipswich.

1891 Smith, Frederick A. A., M.D., C.M., Surgeon to the Cheltenham Eye, Ear, and Throat Infirmary; Portland House, Cheltenham.

1889 Smith, John, M.D., Brycehall, Kirkcaldy.

O.M. Smith, Priestley, Ophthalmic Surgeon to the Queen's Hospital, Birmingham; 34, Paradise Street, Birmingham. (V.-P. 1887-90. C. 1883-6.)

1881 Smith, T. Gilbart, M.D., Physician to the London Hospital; 68, Harley Street, W.

O.M. Snell, Simeon, Ophthalmic Surgeon to the Sheffield General Infirmary; 17, Eyre Street, Sheffield. (C. 1884-7. V.-P. 1892-5.)

1889 Spencer, Matthew H., M.B., B.Ch., 4, Maxilla Gardens, North Kensington, W.

1889 Spicer, Wm. T. Holmes, M.B., Ophthalmic Surgeon to the Victoria Hospital for Children and Ophthalmic Surgeon to the Metropolitan Hospital; 47, Welbeck Street, W.

O.M. Square, W., Surgeon to the Plymouth Royal Eye Infirmary; 14, Portland Square, Plymouth.

1895 †Stamberg, A. C., M.B., 5, Windsor Terrace, St. Heliers, Jersey, Channel Islands.

1886 Stephenson, Sydney H. A., M.B., Surgeon Ophthalmic School, Hanwell; 33, Welbeck Street, W.

1893 Stirling, Alexander Williamson, M.D., 317, Warburton Avenue, Yonkers-on-Hudson, New York.

1887 †Stirling, J. W., M.B., 873, Dorchester Street, Montreal, Canada.

O.M. Story, J. B. (V.-P.), Surgeon and Clinical Lecturer on Ophthalmic and Aural Surgery at St. Mark's Ophthalmic Hospital; Professor of Ophthalmic Surgery, Royal College of Surgeons of Ireland; 6, Merrion Square North, Dublin. (C. 1885-8.)

O.M. †Sturge, W. A., M.D., 15, Rue Longchamp, Nice, Les Alpes Maritimes.

ELECTED

O.M. Swanzy, H. R., Surgeon to the National Eye and Ear Infirmary, Dublin; 23, Merrion Square North, Dublin. (V.-P. 1880-1, 1889-92.)

1888 Sym, Wm. G., M.D., Assistant Ophthalmic Surgeon to the Royal Infirmary; Junior Ophthalmic Surgeon to the Eye, Ear, and Throat Hospital, Edinburgh; Surgeon to the Leith Eye Dispensary; 50, Queen Street, Edinburgh.

1883 †Symons, Mark Johnston, M.D., Ophthalmic Surgeon to the Adelaide Hospital; North Terrace, Adelaide, South Australia.

1886 Sympson, E. Mansel, M.D., Surgeon to the Lincoln County Hospital; 3, James Street, Lincoln.

O.M. Tay, Waren, Surgeon and Ophthalmic Surgeon to the London Hospital; Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 4, Finsbury Square, E.C. (C. 1880-2.)

1882 Taylor, C. B., M.D., Surgeon to the Nottingham Eye Infirmary; 9, Park Row, Nottingham.

1891 Taylor, James, M.D. (C.), Assistant Physician to the National Hospital for Paralysed and Epileptic, Queen's Square; 34, Welbeck Street, W.

1889 Taylor, S. J., M.B., 34, Prince of Wales' Road, Norwich.

O.M. Teale, T. Pridgin, F.R.S., Surgeon to the Leeds General Infirmary; 38, Cookridge Street, Leeds. (V.-P. 1880-1.)

O.M. Thomas, Jabez, Surgeon to the Swansea Hospital and Eye Infirmary; Ty-Cerrig, Swansea.

1885 Thompson, C. Sinclair, Bideford, Devon.

1888 Thompson, John Tatham, M.B., Ophthalmic Surgeon to the Cardiff Infirmary and to the South Wales Institute for the Blind; 24, Windsor Place, Cardiff.

1895 Thompson, Robert, M.D., 214, Queen Street, Brisbane.

1883 †Tobin, William, 31, Hollis Street, Halifax, Nova Scotia, Canada.

LECTED

1883 Tooth, Howard H., M.D., Physician to the National Hospital for the Paralysed and Epileptic and to the Metropolitan Free Hospital; 34, Harley Street, W.

O.M. Tosswill, L. H., Surgeon to the West of England Eye Infirmary, 28, West Southernhay, Exeter.

1890 Turner, William Aldren, M.B, 13, Queen Anne Street, W.

O.M. Tweedy, John, Ophthalmic Surgeon to University College Hospital, and Professor of Ophthalmic Medicine and Surgery at University College; Surgeon to the Royal London Ophthalmic Hospital, Moorfields; 100, Harley Street, W. (C. 1884-7. V.-P. 1891-4.)

1883 Uhthoff, J. C., M.D., Surgeon to the Sussex and Brighton Eye Infirmary; 9, Brunswick Place, Brighton.

1894 Usher, C. H., M.B., Ophthalmic Surgeon to the Royal Infirmary, Aberdeen; 3, Bon Accord Square, Aberdeen.

O.M. Vernon, Bowater J., Ophthalmic Surgeon to St. Bartholomew's Hospital, and to the West London Hospital; 14, Clarges Street, Mayfair, W.

1887 Wainewright, Benjamin, M.B., 67, Grosvenor Street, W.

1888 Walker, Cyril H., M.B., 3, Leicester Villas, Clifton.

O.M. Walker, G. E., Surgeon to St. Paul's Eye and Ear Hospital, Liverpool; 45, Rodney Street, Liverpool.

1892 Walker, H. Secker, Assistant Ophthalmic and Aural Surgeon to the General Infirmary, Leeds; Lecturer on Ophthalmology and Otology, Yorkshire College, Victoria University; 44a, Park Square, Leeds.

1893 Warner, F. Ashton, 10, Brechin Place, S.W.

1893 Warren, H. Guy S., care of Commercial Banking Company of Sydney, 18, Birchin Lane, E.C.

O.M. Watson, W. Spencer, Surgeon to the Great Northern Central Hospital and Royal South London Ophthalmic Hospital; 7, Henrietta Street, Cavendish Square, W. (C. 1883-6.)

ELECTED

1893 †Weekes, Charles Jones, 36, College Street, Hyde Park, Sydney.

1887 Wells, Arthur P. L., M.B., 3, Belsize Park, N.W.

1885 Werner, Louis, M.B., Ophthalmic Surgeon to the Mater Misericordiæ Hospital; Assistant Surgeon to the National and Eye and Ear Infirmary; Lecturer on Ophthalmology in the Catholic University; Examiner in Ophthalmology to the Dublin and Royal Universities; 22, Ely Place, Dublin.

O.M. West, Samuel, M.D., Assistant Physician to St. Bartholomew's Hospital; 15, Wimpole Street, W. (C. 1888-91.)

O.M. *Wherry, G. E., M.B., Surgeon to Addenbrooke's Hospital; Corpus Buildings, Cambridge.

1892 White, G. B. Mower, M.B., 105, Gower Street, W.C.

1895 Whitehead, Arthur Longley, M.B., The General Infirmary, Leeds.

O.M. Williams, R., Surgeon to the Liverpool Eye and Ear Infirmary; 82, Rodney Street, Liverpool.

1894 Williams, W. E., M.B., Portmadoc, Carnarvonshire.

1889 Williamson, Geo. E., Hon. Surgeon, and Surgeon to the Eye Department of the Royal Infirmary, Newcastle-on-Tyne; 8, Eldon Square, Newcastle-on-Tyne.

1888 †Willis, C. Fancourt, M.D., Quetta, Baluchistan, India.

1889 Wood, David J., M.B., Colonnade Chambers, 17, Shortmarket Street, Cape Town, South Africa.

1889 Woodburn, Wm. H., 42, Sunderland Road, Forest Hill, S.E.

O.M. Woodhead, G. Sims, M.D., Beverley, Nightingale Lane, Balham, S.W. (C. 1894-5.)

1890 *Wray, Chas., Bank Chambers, Northend, Croydon.

RULES.

1. *Object of the Society.*—The object of the Society is the cultivation and promotion of Ophthalmology in the United Kingdom, India, and the Colonies.

2. *Constitution.*—The Society shall consist of Ordinary and Honorary members. All registered medical practitioners of the United Kingdom, and all legally qualified medical men in India and the colonies, whose qualifications are satisfactory to the Council of the Society, shall be eligible as ordinary members.

3. The officers of this Society shall consist of a President, four or more Vice-Presidents, a Treasurer, two Secretaries, a Librarian, and twelve other members, who together shall form the Council and manage the Society's affairs.

4. *Ordinary Members.*—Candidates shall be proposed on a form provided for the purpose and signed by three members from personal knowledge. The proposal paper shall be read at one Ordinary Meeting, and the Ballot shall be taken at the following Meeting. No election shall take place unless ten members vote, and no person shall be elected who does not obtain four fifths of the votes given.

5. *Form of Admission by the Chairman.*—Members shall be admitted personally by the following form, after signing their names in the Admission Book, and paying their first Annual Subscription. *Form of admission.*—"By the authority and in the name of the Ophthalmological Society of the United Kingdom, I admit you a member thereof."

6. *Honorary Members.*—The Council shall have the power of proposing for election as Honorary members men of distinguished eminence in Ophthalmology, or in the sciences bearing upon it. They shall be elected by ballot in the same manner as Ordinary members at the next meeting. The Honorary members shall not exceed ten in number.

7. *Resignation of Members.*—Any member may retire from the Society after signifying his intention in writing to the Secretaries and paying any contribution due from him.

8. *Re-admission of Members.*—Any member who has retired from the Society and wishes to rejoin it, must be proposed, balloted for, and admitted in accordance with Rules 4 and 5.

9. *Expulsion of Members.*—A member can be expelled only at a General Meeting especially called for that purpose, and of which a written notice shall have been sent to every member at least fourteen days previously. At least ten votes must be recorded, and four fifths shall carry the expulsion.

10. *Subscriptions.*—The Annual Subscription shall be One Guinea, payable in advance in the month of October. Each member on election shall pay an Entrance Fee of One Guinea in addition to the Subscription, but in the case of a member elected at a meeting of the Session subsequent to Easter he shall not be required to pay a Subscription during the next Session.

11. *Arrears.*—Any member whose Subscription is six months in arrear shall be reminded of the same by one of the Secretaries, and if it be not paid within the current year he shall cease to be a member.

12. *Composition Fee for Resident Members.*—Any member may on entrance pay a Composition Fee of Fifteen Guineas and be thereby exempted from paying any further Subscriptions, such member enjoying all the same rights and privileges as if he were a Subscribing member. After entrance, the Composition Fee will be according to the following scale:—After less than five payments Fourteen Guineas, after five payments Thirteen Guineas, after ten payments Twelve Guineas, after fifteen payments Eleven Guineas, after twenty payments Ten Guineas, after Twenty-five payments Eight and a Half Guineas, after thirty payments Seven Guineas, after thiry-five payments Five Guineas, after forty payments Two and a Half Guineas, and after forty-five payments *nil.*

13. *Composition Fees for Non-Resident Members.*—Any member resident out of the United Kingdom may pay a Composition Fee of Seven Guineas instead of the Annual Subscription, and will then be entitled to receive, post free, a copy of the Society's 'Transactions' each year, and to have his name printed in the list of members; but if at any time he subsequently become a Resident member of the Society, the question of further payment by him shall be decided by the Council. N.B.—The Composition Fee will be held to include the Entrance Fee if paid any time during the First Session.

14. *Election of Officers.*—The Officers of the Society shall be elected yearly by Ballot at the Annual Meeting, to which all the Ordinary members shall receive one week's notice. Balloting lists of the

names recommended by the Council for election shall be sent to each Ordinary member, together with the notice of the Annual Meeting. In the event of any name being substituted for any recommendation of the Council, the election shall not be valid unless effected by a majority of those present at the meeting. The President shall not hold office for a period of more than two consecutive years. No other member of the Council, except the Treasurer and the Librarian for the time being, shall hold the same office for more than three consecutive years. Any ordinary member of Council who has been absent from all the meetings of the Council for one session shall not be eligible for election to the Council for the ensuing session.

15. *Scrutineers.*—Two Scrutineers appointed by the President at the commencement of the Annual Meeting shall receive the lists during the first hour, and report the result to the President, who shall have a casting vote.

16. *President and Vice-Presidents.*—The President shall regulate all the proceedings of the Society and Council, state and put questions, interpret the application of the Laws, and decide any doubtful points. He shall check irregularities and enforce the observance of the Laws. He shall sign the minutes of General and Council Meetings. In the absence of the President one of the Vice-Presidents, the Treasurer, or some other member chosen by the Meeting, shall perform his duties.

17. *Secretaries.*—The Secretaries shall manage all correspondence, shall attend every meeting of the Society and Council, and take minutes, which shall be read at the following meeting. They shall notify to new members their election. They shall arrange with the President the order of proceedings at all the meetings. They shall have charge of and keep a register of all papers communicated, and shall be the Editors of the 'Transactions.'

18. *Treasurer.*—The Treasurer shall receive all moneys due to the Society, and make all payments ordered by the Council, keeping an account of all such receipts and payments. He shall keep a printed receipt book for the subscriptions, and every receipt shall be signed by himself and countersigned by one of the Secretaries. He shall present to the Annual Meeting a written Report of the financial state of the Society, signed by himself and by two members of the Audit Committee.

19. *Librarian.*—The Librarian shall have entire charge and control of the Library. He shall purchase books for the Library as opportunities arise at his discretion out of the grant previously voted for this purpose by the Council. He shall see that all books

belonging to the Society are duly entered in the Catalogue, and that the periodicals and pamphlets are from time to time, as occasion may require, suitably bound. It will be his duty to see that the Library Rules are not infringed.

20. *Audit Committee.*—The President, one of the Secretaries, and two members of the Society nominated by the President at some meeting of the Society previous to the Annual Meeting, shall form a Committee to audit the Treasurer's accounts.

21. *Meetings of Council.*—The Council shall meet immediately after the meetings in October, January, May, and June, and at such other times as they may be specially convened. Three shall form a quorum. The Council shall determine questions by show of hands (or by Ballot if demanded), the President having in both cases a casting vote in addition to his ordinary vote. The Council shall decide upon all questions relating to the reception of communications, and to their publication in the Society's 'Transactions.'

22. *Vacancies of Officers.*—The Council shall have the power of filling up any vacancies which may occur in any of the offices of the Society between one Annual Meeting and another.

23. '*Transactions.*'—A copy of the 'Transactions' shall be sent to each Ordinary member of the Society, whose subscription is not in arrear, and a copy of the 'Transactions' shall be sent to each Honorary member of the Society.

24. *Meetings.*—The dates of Meeting of the Society shall be unless otherwise determined by the Council, the third Thursday in October, the second Thursday in November and December, the last Thursday in January, the second Thursday in March, the first Thursday in May, and the second Thursday in June. The Annual General Meeting shall be held on the Friday after the first Thursday in July. The Ordinary Meetings shall be held from 8.30 to 10 p.m., but the meeting may be prolonged to a given time on the proposal of a member, duly seconded and carried by a show of hands.

25. *Visitors.*—Each member may introduce two members of the Medical Profession as visitors, who shall sign their names in the attendance book, opposite to the name of the member introducing them.

26. *Business at Ordinary Meetings.*—The business at Ordinary meetings shall consist during the first half hour in the discussion of cases and specimens shown by card, after which the papers shall be read and discussed.

27. *Card Cases and Specimens.*—Card cases, &c., may be shown during the half-hour preceding the meeting; they must be described on cards provided for the purpose, and the description must include all particulars intended for publication.

28. *Order of Communications.*—Communications shall be taken in the order in which they have been sent in to the Secretaries, subject to the discretion of the President. No communication shall occupy more than twenty minutes in the reading, and in the subsequent discussion of it no member shall speak more than once or for more than ten minutes. If an author be not present when the time arrives for his communication to be read, it shall be dealt with as the President may direct.

29. All papers must be sent to the Secretaries at least one week before the meeting, together with an abstract suitable for immediate publication in the journals. When possible, notice should be given relating to card cases, &c. All papers read before the Society shall be deemed the exclusive property of the Society, and if published elsewhere by the author without the express permission of the Council shall thereby be disqualified for admission into the Society's 'Transactions.'

30. *Committee of Reference.*—Six members of the Society shall be chosen annually by the Council to act with the Secretaries as a Committee of Reference, and any communication to the Society may be referred by the Secretaries to two or more members of such Committee of Reference, for the purpose of considering the fitness of the communication in question to be read before the Society, or to be published in the Society's 'Transactions.'

31. *Alteration of Laws.*—Nothing relating to the Laws or management of the Society shall be considered at Ordinary Meetings.

32. *Business at Annual Meeting.*—The Annual General Meeting shall be convened by special summons; ten shall form a quorum. The business shall consist in the Election of Officers, the presentation and adoption of the Annual Report, and the discussion of any proposed alteration of the Rules, notice of which shall be given in the summons convening the meeting. No alteration in the Rules shall be adopted unless four fifths of the votes are given in its favour.

33. *Special General Meeting.*—A special General Meeting may be called at any time, on one week's notice, by the President or any three members of the Council, or on the requisition of fifteen members of the Society. The nature of the business to be transacted at such meetings shall be specified in the summons sent to each member of the Society, and no other business shall be considered.

LIBRARY RULES.

1. The Library shall be open at the same hours as that of the Medical Society, viz. from 1 p.m. to 6 p.m. daily, except on Saturdays, when it will be closed at 3 p.m.

2. Members will be entitled to read the books belonging to the Society at 11, Chandos Street, between those hours, or to take them out on signing a book provided for that purpose. But any books of extraordinary value may be placed by the Council on a separate list, such books not being allowed to be removed from the Library.

3. A large number of the current periodicals will be accessible to Members in the Library. These will not be allowed to be taken out of the Library.

4. A book must be returned at the expiration of a fortnight if wanted by any other Member. The Librarian will in such a case write to the Member in whose name the book was taken out.

5. If the book be not returned within four days of such notice a fine of 6d. will be charged for each day that the book is retained beyond such days of grace.

6. Instruments and drawings cannot be taken out of the Library except with the express permission of the Council.

7. A Member taking out a book will be held responsible for its being returned in good condition.

THE BOWMAN LECTURE.

Resolution of Council, September 18th, 1883.

"That in recognition of Mr. Bowman's distinguished scientific position in ophthalmology and other branches of Medicine, and in commemoration of his valuable services to the Ophthalmological Society, of which he was the first President, the Council shall each year, or periodically, nominate some person to deliver a lecture before the Society, to be called 'The Bowman Lecture,' which shall consist of a critical *résumé* of recent advances in ophthalmology or in such subject or subjects as the Council shall select, or of any original investigation, and shall be delivered at a special Meeting of the Society held for the purpose, at which no other business shall be transacted."

LIST OF COMMUNICATIONS

BROUGHT BEFORE THE SOCIETY DURING THE SESSION 1894-95.

PAGE

Subjective Visual Sensations: being the Bowman Lecture, delivered on Friday, June 14th, 1895. (With Plates I, II, III.) By W. R. Gowers, M.D.Lond., F.R.S. 1

I. DISEASES OF THE EYELIDS.

1. Nine cases of chancre of the eyelids and conjunctiva. By Simeon Snell 39
2. Chancre of eyelids. By Walter H. Jessop 48
3. Complete ankyloblepharon. By Kenneth Scott (Cairo) 49

II. DISEASES OF THE CONJUNCTIVA.

1. Osteoma of the conjunctiva. By Gustavus Hartridge 51
2. Two cases of membranous conjunctivitis in which Loeffler's bacillus was found; treatment by antitoxin. By Walter H. Jessop 55
3. Case of severe hæmorrhage from palpebral conjunctiva. By Walter H. Jessop 64
4. Result in a case of pemphigus of conjunctiva (exhibited at the Society, June, 1893.) By R. Marcus Gunn 68

III. DISEASES OF THE CORNEA.

PAGE

1. Discoloration of the cornea with blood-pigment. (With Plate IV, fig. 1.) By E. Treacher Collins 69
2. Three specimens of blood-staining of the cornea. By John Griffith 86
3. Tuberculous keratitis. By Gustavus Hartridge 87
4. Alveolar sarcoma of the cornea. By E. Donaldson (Londonderry) 90
5. Marginal ulceration of both corneæ associated with bullæ. By E. C. Fischer 92

IV. DISEASES OF THE IRIS AND CILIARY BODY.

1. On the iritis of the later stages of syphilis. By W. A. Brailey 93
2. Tubercle of iris and ? cornea. By Donald Gunn 101
3. Tuberculosis of the iris and ciliary body. By A. Quarry Silcock 102
4. New pigment spots on anterior surface of iris. By Walter H. Jessop 103

V. DISEASES AND INJURIES OF THE LENS.

1. Lamellar cataract and rickets. By E. Treacher Collins 104
2. Traumatic cataract with a foreign body in the lens successfully treated by operation. By W. Spencer Watson and W. J. Collins 115
3. Cholesterine crystals in the lens. By W. Lang 117
4. Cholesterine crystals found in a cataractous lens. By W. Lang 118

PAGE

5. Coralliform cataract with crystals (? of cholesterine) in the lens. (With Plate IV, fig. 3.) By R. Marcus Gunn 119
6. Peculiar variety of lamellar cataract. (With Plate IV, fig. 2.) By R. Marcus Gunn 119
7. Case of lamellar cataract showing symmetrical markings. (With Plate V.) By George Lindsay Johnson 120
8. Traumatic subluxation of lens; secondary zonular cataract and coloboma lentis. (With Plate IV, fig. 4.) By R. Marcus Gunn 121
9. Lenticonus posterior. By W. Lang 122
10. Spontaneous symmetrical dislocation of both crystalline lenses. By R. Marcus Gunn 122

VI. DISEASES OF THE RETINA AND CHOROID.

1. A case of retinitis proliferans. By E. C. Fischer 124
2. Detachment of retina with + tension. By Charles Wray 125
3. Horizontal equatorial rupture of choroid. (With Plate IX, fig. 2.) By E. Kenneth Campbell 126

VII. DISEASES OF THE OPTIC NERVE.

1. Nasal coloboma of the optic nerve; grey atrophy of the disc with peculiar fields; temporal hemianopia in the right eye, inferior hemianopia in the left eye; nervous symptoms of obscure origin. By George Ogilvie 127
2. Optic atrophy in acromegaly, with charts of fields of vision. By R. W. Doyne. 133
3. Extreme congestion of optic discs in a case of hypermetropia. By R. Marcus Gunn 136

VIII. PARASITIC DISEASES.

PAGE

1. Case of *Filaria loa*, in which the parasite was removed from under the conjunctiva. (With Plate VI.) 137
   Further note of case of *Filaria loa*. (With Plate VII.) By D. Argyll Robertson 162
2. A case of hydatid cyst of orbit; removal of cyst, with preservation of eye and vision. By J. B. Lawford 167

IX. INTRA-OCULAR GROWTHS.

1. Intra-ocular melanotic sarcoma with peculiar characteristics. By F. H. Hodges and N. C. Ridley 178
2. Cystic sarcoma of the ciliary body. By C. Devereux Marshall 180
3. Tubercular growth in eyeball. By C. Devereux Marshall 181
4. ? Gummatous growth in the eye. By C. Devereux Marshall 183
5. Sarcoma of iris. By H. Secker Walker 184

X. DISEASES OF THE ORBIT.

1. Plastic cellulitis of orbit. By Geo. Lawson 185
2. Pulsating tumour of orbit. By Bowater Vernon 191

XI. CONGENITAL ABNORMALITIES.

1. Polycoria, with deep pitting of the optic disc. By E. Treacher Collins 192
2. Anterior synechia of pupillary membrane (congenital). (With Plate VIII, fig. 1.) By A. Quarry Silcock 193
3. Congenital pigmentation of retina. (With Plate IX, fig. 1.) By H. Work Dodd 194
4. Unusual arrangement of retinal vessels. (With Plate VIII, fig. 2.) By J. B. Lawford 195

PAGE

5. Microphthalmos and persistent hyaloid artery. By A. Stanford Morton 195
6. Double anterior polar cataract with persistent pupillary membrane. By A. Quarry Silcock 196
7. Peculiar *coloured* lenticular opacities; probably congenital. By J. B. Lawford 197
8. Pulsating exophthalmos (congenital). By Ernest Clarke 198

XII. MISCELLANEOUS.

1. Eyesight and the public services. By George Mackay 199
2. Ophthalmia nodosa. By J. B. Lawford 210
3. Formol as a hardening reagent for eyes and other tissues. By C. Devereux Marshall 229
4. The extraction of transparent lenses in high myopia. By Charles Wray 233
5. Case of high myopia treated by removal of both lenses. By G. Lindsay Johnson 239
6. A case of enophthalmos becoming exophthalmos on stooping. By E. Treacher Collins 240
7. Double enophthalmos. By A. Stanford Morton 241
8. Ophthalmoplegia externa without other symptoms. By C. E. Beevor 242
9. Cholesterine in the anterior chamber. By Gustavus Hartridge 244
10. Cholesterine in the subretinal fluid of a detached retina in the eye of an infant removed for buphthalmos. By Messrs. Hartridge and Griffith 244
11. Sarcoma of anterior part of the brain, with extension through the skull, connecting it with a large tumour outside the skull. By W. J. Cant (Lincoln) 245
12. Tumour of right malar region. By A. Stanford Morton 246
13. Rodent ulcer. By A. Stanford Morton 247

XIII. INSTRUMENTS.

PAGE

The Indian oculist and his equipment.
By Surg.-Capt. H. E. Drake-Brockman 249

Appendix 254

Report of Council 255

Index 259

LIST OF PLATES.

PLATE		FACING PAGE
I—III.	Subjective Visual Sensations. (Dr. Gowers.) (Page 1)	38
IV.	Fig. 1. Discoloration of the cornea with blood-pigment. (Treacher Collins.) (Page 69) Fig. 2. Peculiar variety of lamellar cataract. (R. Marcus Gunn.) (Page 119) Fig. 3. Peculiar Coralliform cataract. (R. Marcus Gunn.) (Page 119) Fig. 4. Traumatic subluxation of lens, secondary zonular cataract, and coloboma lentis. (R. Marcus Gunn.) (Page 121)	69
V.	Lamellar cataract with symmetrical markings. (Lindsay Johnson.) (Page 120)	120
VI.	Male *Filaria loa*. (Dr. Argyll Robertson.) (Page 137)	137
VII.	Female *Filaria loa*. (Dr. Argyll Robertson.) (Page 162)	162
VIII.	Fig. 1. Anterior synechia of congenital pupillary membrane. (A. Quarry Silcock.) (Page 193) Fig. 2. Unusual arrangement of retinal vessels. (J. B. Lawford.) (Page 195)	193
IX.	Fig. 1. Congenital pigmentation of retina. (H. Work Dodd.) (Page 194) Fig. 2. Horizontal equatorial rupture of choroid. (E. Kenneth Campbell.) (Page 126)	194

WOODCUTS.

FIG.		PAGE
1.	Scheme of relation of half-fields	7
2.	Fields for red and green	13
3.	Outer horizontal radius of the right field	15
4.	Mobile angled sphere	27
5.	Obscuring effect of the expanding spectrum	29
6.	The limiting spectrum	32
7.	,, ,,	32
8.	Arched spectrum	35
9.	The lateral spectrum	36
10.	Alveolar sarcoma of the cornea	91
11.	Field of vision	129
12.	,, ,,	129
13.	,, ,,	132
14.	,, ,,	132
15.	,, ,,	134
16.	,, ,,	134
17.	,, ,,	135
18.	,, ,,	135
19.	*Filaria loa*, male. Nat. size.	141
20.	,, ,, × 6	141
21.	,, head of male	142
22.	,, tail of male. Dr. Logan's	142
23.	,, ,, Dr. A. Robertson's	142
24.	,, under surface of the tail—diagrammatic	144
25.	Antero-posterior section of eyeball and tumour	179
26.	Tumour of right malar region	247

SUBJECTIVE VISUAL SENSATIONS.

BEING

THE BOWMAN LECTURE,

Delivered on Friday, June 14th, 1895,

By W. R. Gowers, M.D.Lond., F.R.S.,

CONSULTING PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL; PHYSICIAN TO THE NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC.

Mr. President and Gentlemen,—I count it no small honour to be one of the links of the chain of "Bowman Lecturers"—a chain which connects the recent past, and also the days that have already faded in the distance, with a future that will be, we hope, remote. Thirty-five years ago the names of Todd and Bowman were those of the makers of some, and the framers of much, of the physiology then current. Their names were on the lips of teachers in connection with discoveries and work which then seemed distant to the student who made his first entry on the world of science. They seemed so much part of the past that it was a surprise to learn that, though one of the illustrious pair had ceased from his labours, the other was not only an active worker, but was the leading ophthalmic surgeon of Europe. When in after years I came to know him personally, although but slightly, his personal characteristics impressed me as the very ideal of refined mental power, combined with quiet

earnestness and with the courtesy that is born of perfect kindness—all expressed in a face and by a manner which, once seen, no memory could lose. It will always be a source of satisfaction to me to remember that, though the suggestion would probably soon have been made by another, I had the privilege of directing the attention of the Council to the fitness of connecting the name of Bowman with the Ophthalmological Society by the establishment of this Lecture, that the suggestion bore immediate fruit, and that it was a source of pleasure to him we thus honour, and by which not less are we also honoured. Alas! the Lecture is now delivered to his memory, but it is pleasant to think that the Society did not postpone its establishment until the time had passed when it could afford pleasure to him to whom the expression of regard was given. Is it not sad that so often the living are only awakened to a sense of that which should be, by the death which makes it a satisfaction only to those who render? Although the Bowman Lecture is now only a memorial, the memory which it keeps up is still a vivid recollection to a large number of the members of our Society. With each year, however, the number of those who bear in mind that impressive and inspiring personality must become fewer. To one who still retains it, the memory gives to the task of delivering this lecture a keen sense of responsibility, lest he should fail to strike the note of severe restrained regard for all that is highest in scientific effort which Bowman ever set. But the personal fear of inadequacy is lessened by the recollection that no one was ever more ready than he to see the effort where performance failed, to commend the trifling good, and to ignore that which, far more obtrusive, might reasonably warrant censure,—a censure which, for merely intellectual failure, never, I think, came from him. I need this consciousness to-night, for I cannot follow his great example of absolute practical homage to fact, to fact observed with definite precision. Alike in the science of life in general, and of one part of life in particular, normal and perverted, theory seemed

to find no place in his work. No doubt it had its place and influence, in due position and degree, but it was subordinate and never obtruded. To-night I cannot escape from theory, or from the compulsion of even obtruding it. True, times have changed. Speculation has grown, and hypothesis, as the scaffold for useful observation, has become necessary in a manner and to a degree of which the workers of half a century ago had perhaps no adequate conception.

In selecting as the subject for this lecture the visual sensations that occur without external cause, I hoped to be able to reduce to some order the numerous facts recorded in my case-books in connection with epilepsy and migraine, and to do so with the help of that which has been discerned and described by others. But I have found among the facts some which seem to be so instructive in a special relation that I have felt compelled chiefly to limit myself to a small part of the subject. Even within this narrow range, instead of explaining, I find myself able merely to point out that which needs explanation, and this only in salient outline, in the hope that others may be able to see more clearly from the standpoint to which they may attain, as successive steps are cut in the steep hill-side of fact. Thence a wider prospect and a truer perspective may be obtained, as the winding path of daily work is ever bringing before the eye new views of that which has long been known, and perhaps misknown. The facts with which I have to deal are those of everyday experience, and yet are only now and then presented to us in needful definiteness of form and precision of discernment. I can only hope to-night to indicate how the facts should be regarded. Unless some idea exists of what to look for, we shall see but little.

The difficulty of ascertaining the facts depends on their subjectivity. That which is to be discerned can be seen only through the vision of another. Moreover this is the vision of the unreal ; it is the sight of that which is not.

Yet, though unreal, to the subject it is, as a sensation, a profound reality, which confuses the mind and may make even recollection painful. Hence the opportunities for ascertaining trustworthy facts are very rare, and when they come it is important that they should be made the most of. If that which I have to say to-night induces others to seize some of the opportunities that abound, and to make known the facts they learn, I shall feel that my work is successful.

As I have said, the visual sensations met with in the two diseases, epilepsy and migraine, are far too varied to be considered in detail in their numerous forms. But they present one relation which transcends all others in interest, in difficulty, and in importance. This is the apparent relation of the sensations to the functions of the cerebral centres in which we must assume that they arise, and through which we must also assume conscious vision of external objects is achieved. In 1885 I put foward the opinion, which has been confirmed by all that I have since been able to perceive, that, in addition to the half-vision centre in the occipital lobe, demonstrated by Munk, the indications obtained by Ferrier are correct, and that there exists a higher visual centre in the region of the angular convolution, which immediately subserves the perception of visual impressions. As I then suggested, impressions seem to pass to this higher centre in each hemisphere from both half-vision centres in the occipital lobes, in such a way that in each higher centre both fields of vision are represented, but that of the opposite eye in greater degree; that the connexion between the two higher centres is very intimate; and that the function of the higher centre differs from the lower in two ways. First, it seems to present the mysterious feature that, while partial disease of the lower centre causes partial loss of the related half-field, which cannot be compensated, partial disease of the higher centre seems to lower the function of the whole in a way we cannot at present understand. Secondly, and perhaps associated with this,

there is some capacity for compensation by the other hemisphere, which is greatest in the lower animals. This may be one reason why the pathological evidence of this centre in man is so scanty, and another cause may be found in the fact that the centre is in the region of the blood-supply of two different arteries, and so is seldom entirely destroyed. The facts that suggest—indeed, I think, indicate—the existence of this centre in man I have repeatedly stated during the last ten years. In the strange hemianæsthesia of hysteria we have evidence of arrested action of all the other higher special sense centres in one hemisphere. In this association we never meet with the hemianopia that results from disease of the lower centre, in the posterior extremity of the hemisphere. Instead, we have the "crossed amblyopia," as it is termed; peripheral vision is lost in both eyes, central vision persists in a small area in the opposite eye, and in a larger area in the eye of the same side. No trace is found of any relation to the half-fields. But hysteria is a byword, and all facts, however definite, with which the name can be connected, are disregarded by physiologists. Yet the same affection of vision occurs in organic disease. I have given an illustration of it,* as a lasting symptom, in a case in which it was caused, with hemiplegia, by a sudden lesion, probably hæmorrhage, in one hemisphere. A similar loss has been met with when the angular region was found diseased.† When hemianopia is caused by disease of the cerebral hemisphere there is commonly a like contraction of the remaining half-fields, greater in the eye of the opposite side.‡ A careful scrutiny of pathological evidence makes it probable that in these cases the disease is in the white substance, interrupting the half-vision path, and extending forward to the fibres beneath the higher centre, or to its grey matter. These

* 'Manual of Diseases of the Nervous System,' vol. ii, second edition, fig. 83 (first edition, fig. 81).

† Ibid., fig. 15 (first edition, fig. 14).

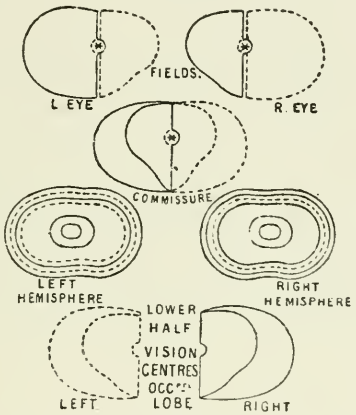
‡ Ibid., fig. 82 (first edition, fig. 80).

may seem meagre grounds for the assertion that here we have a higher visual centre, but they agree in a remarkable way with the experimental results obtained by Ferrier, and a large number of the facts of disease cannot otherwise be understood. A theory that explains is not necessarily true. But if a theory that affords an explanation which can be obtained in no other way, has other varied and quite independent evidence, it seems to me that we are justified in its assumption. I have to ask you to postulate these higher visual centres, for I can only usefully describe the facts, or suggest their significance, by placing them in front of this hypothesis.

Note the necessary significance of "crossed amblyopia." With loss of the higher visual centre of the left hemisphere, we have, in the right eye, vision only in a small central region; in the left eye, sight remains in a larger central region. In each eye there is peripheral loss. The significance of this is that the vision which remains is subserved by the right higher centre acting alone. This subserves a large central region on the opposite side, a small central region on the same side, but, without the co-operation of the opposite centre, it cannot subserve peripheral vision in either eye. The facts are certain, and their meaning seems to me to be clear. In the central regions of the fields, vision can be subserved by either hemisphere alone; in the peripheral parts, by neither alone. It is as if the impulses from the periphery of each retina ultimately reached the higher centre of one side through that of the opposite side,—as if those from the peripheral region of each half-vision centre in the occipital lobe passed to the opposite hemisphere indirectly, through the higher centre of the same side, and those from the central region passed directly from the half-vision centre to each higher centre. So that, for instance, the peripheral impressions, to reach the right higher centre, have to pass through the higher centre on the left side, and the loss of this involves peripheral blindness on both sides. Whether this is so, or

whether some reflected co-operation is essential, the facts show how extremely close is the functional relation of the two. The relative function of the centres is indicated in the accompanying diagram, so far as the dim suggestion of the facts permits a vague conception to be formed. Even the least definite conception may enable more to be perceived.

FIG. 1.



Diagrammatic scheme of the relation of the half-fields at the chiasma, occipital lobes, and in the higher centres. The object is to suggest the representation of both fields in the higher centres, with preponderance in each, of the half-fields of the opposite side.

In this higher visual centre we must assume the processes to occur on which the subjective visual sensations depend. From this conclusion I think there is no escape. The fact will become distinct as we consider their features on this assumption. The more elaborate function of this centre may be connected with the instability which underlies these symptoms. They reveal not only how extremely close must be the connection between the visual centres of the two hemispheres, but that, as regards some part of their functions, they must be regarded almost as one centre, as united in a manner more essential than that in which any other centres of the

two hemispheres are conjoined. This is, indeed, not surprising when we consider how unique is the function of sight as subserved, first by the two eyes, and secondly by the lower visual centres, in which the half-fields are represented in so limited a manner. Only from the region of the fovea centralis do fibres pass to each occipital lobe;—only in a small region around the fixing point, varying in size in different persons, but often too small to be revealed by the ordinary perimeter, is vision subserved by each lower centre. On the other hand, the whole of each field is in some way related to each higher centre. These facts are suggested by the features of loss of function. Subjective visual sensations present these higher centres in another aspect, that of their activity, and not of their loss. They yield us numerous facts, in part most definite, to compare with the facts of loss. The ground is one on which we have to tread with caution, where the danger of fallacious inference is great. Yet that which is seen must contain in it the evidence of important facts which can be discerned in no other way.

I. Epilepsy.

The "warning" (or "aura") which occurs at the moment of onset of an epileptic fit—the first effect on consciousness of the process of "discharge"—is often a visual sensation. This may be part of the "warning," but may not be the first or only event. It may be preceded by some other sensation or it may be followed by some other, but it shows that the process of discharge occurs first or early in the visual centres. Such sensations are extremely varied, but they are, as a rule, constant in the same patient. This occurrence, as part of the "warning," shows that the discharge in these centres takes place while consciousness is but little impaired.

The simplest of these visual warnings are sudden flashes of light or colour, sparks or stars, often in rapid movement

among themselves, apparently like the movement of water-beetles on a pond. Sometimes a large luminous object appears, which may move across the field, or seem to approach or to recede. There may be two such objects, rarely three, and they may be white or coloured. More elaborate sensations are figures of scenes, persons, or of faces, often distorted. A figure also may move. Occasionally there is a vision of some place or scene, such as is quite beyond the possibility of past experience. These elaborate sensations—"psycho-visual," as they may be termed—are often associated with definite mental states, which may be very curious. The warning in one patient was a definite vision of London in ruins and the river Thames emptied to receive the rubbish; a conception that all the inhabitants had perished, and that she stood alone in the scene of desolation.

The associations of these visual sensations are noteworthy, but I must only mention the fact that they are frequently with other special sensations, especially with the sense of hearing, seldom with smell. The associated sensation is generally of the same degree of elaboration. A patient who sees figures will seem to hear words uttered by them, although the words are generally forgotten—an association which reminds us of the celebrated vision on which the fame of Lourdes arose. One curiously complex visual warning, experienced by the same patient through many years before every fit, I have described elsewhere,* but it deserves mention. A sense of beating of the heart ascended the chest to the head, and became audible as a pulsating sound; then two lights appeared before the eyes, which seemed to approach by jerks; they suddenly disappeared and were replaced by the figure of an old woman in a red cloak, who offered the patient something which had the smell of Tonquin beans, and then he always lost consciousness. The case is remarkable on account of the change of the sensation of simple pulsation to that of sound, and the association of the latter with a pulsating visual

* 'Epilepsy, &c.,' Lond., 1880, p. 67.

spectrum, the replacement of these by a highly complex vision, and the final termination with an olfactory sensation, probably elaborate. There is reason to think that the more pleasant subjective sensations of smell are more elaborate than the common disagreeable sensations. The jerky movement, definitely synchronous with the pulse, is not uncommon in such simple visual sensations, and seems to indicate that the process, in the disturbed centre of the brain, is modified by the mechanical influence of the arterial pulsations. I may point out also the interesting fact that the more elaborate sensation, the vision of the woman, *followed* the more simple one, the two lights. This sequence is more common than the opposite, although now and then an elaborate sensation is followed by one that is more simple.

The sudden spontaneous activity, which we call "discharge" of the centre, may occur as a primary event, but it is often preceded by sudden arrest of function, by inhibition of the centre. It is one of many instances of the fact that the same functional derangement, in different degree, may cause cessation of action or increased action. In one case, suddenly all became dark, then there appeared a red light before the eyes, changing presently to green, and then consciousness was lost and the convulsion came on. In another, sight became dim and misty, then two round green lights appeared, compared to a penny at a distance of two feet; these moved from side to side. It is very common for the first darkness to be the background for bright stars. In these cases there is discharge in a centre first inhibited. Much less frequently, stars or flashes of light are followed by loss of sight and darkness,—that is, discharge is followed by inhibition.

Colours.

The colours seen in these epileptic sensations are generally either green, red, blue, or yellow; a reddish yellow is especially frequent, and seems to be very much

the colour commonly assumed to be that of flame. Now and then emphasis is laid on the bright golden character of the yellow. The transition of red to green just mentioned I have met with in two or three other cases. It is interesting on account of the complementary character of the two colours, and the fact that the transition from one to the other is due to a central process. The cerebral functions must correspond in mutual relation to those of the retina. A complementary colour in an after image must express not only retinal action, but also central processes. We are not yet in a position to discern anything regarding the nature of the colour process in the centres. The subject is of extreme interest in connection with the problems of colour vision, to the physical relations of which so much attention has been lately given. I believe that ultimately the study of the central phenomena will throw light upon the subject, possibly of supreme importance, but much more work has to be done before this is possible.

The perception of colour in the visual sensations which precede epilepsy presents to us one feature which must detain us for a short time. It is equally obtrusive in the visual sensations of migraine which I shall have presently to describe. It is the fact that the subjective colour sensations seem to extend to the extreme periphery of the field. Colours are as distinct and frequent in the peripheral region as in the central region. I could give you many illustrations, but one will suffice. Green is the colour which is said to have the smallest colour-field, its perception being often described as confined to the central region. But to one patient, before each fit, there appeared the vision of a green colour over the whole lower half of the combined fields, extending from side to side and down to the lowest part, as was clearly shown by his spontaneous description that "it was just as if he were standing in a field of grass."

Peripheral colour vision.

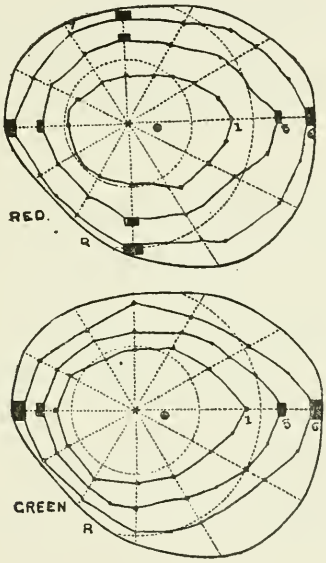
Different as the arrangement of function in the centres is from that in the eyes, there must be, in some way, a perfect reproduction of the function of the retinal fields in the higher centres. Although it is in altered form, whatever vision the periphery of the retina subserves, the parts of the visual centres related to the periphery must subserve the same vision in the same way, similar in character and in degree. The fact that the subjective sensations may present every colour in the peripheral part of the field—even green, to which the retina seems least sensitive—brings before us the question of peripheral colour vision. The facts I am about to state have been well known for nearly twenty years, since Chodin* worked at peripheral colour vision in regard to saturation. They were described by Landolt, but they are not very familiar, and they are curiously inconsistent with the statements commonly made. It is often said that the field in which red can be seen is a central region the limit of which crosses the outer horizontal radius at 45°. This limit is even spoken of as "the boundary of the field for red." But this is only the area in which red can be perceived on an object one centimetre square. The same statement in regard to a still smaller region is made respecting green. But with a larger area of colour it is found that all the colour-fields differ in extent very little from the fields for white. On the temporal side, in each field, red can be seen as such up to 90°.

Let us first take the red field (Fig. 2). It is easy to ascertain that this depends in extent simply on the size of the coloured object. It is convenient to take, as an example, the outer horizontal radius—that is the horizontal radius of the field in the temporal half. The limit of the area in which the colour red can be discerned in an area half a centimetre square is, I find, at 35°, and for a quarter-centimetre

* 'Archiv für Ophthalmologie,' Band xxiii; see also Landolt, 'A Manual of the Examination of the Eyes;' and Swanzy, 'Diseases of the Eye,' p. 19.

square at 25°. If we pass beyond the one centimetre limit at 45°, which is commonly figured as that of the field for red, we find that red in an area two centimetres square is seen at 60°, three at 70°, four at 78°, five at about 82°, while in the area of six centimetres square it is seen up to the extreme edge of the field. Upwards, downwards, and on the nasal side of the field, in which the range of vision is

FIG. 2.



The fields for red and green in areas of 1, 5, and 6 centimetres in concentric dimensions, and two thirds in radial dimension. (The latter is not accurately indicated in the black areas which represent the degrees occupied by the object.)

so much more limited, the areal limits are closer together, so that on the inner horizontal radius the three-centimetre limit is at 40°, and the six-centimetre area of red can be seen at 50°—that is, at the edge of the field for white. Every field is practically concentric with the field for white. In the case of blue and yellow still smaller areas suffice to permit the colour to be seen up to the edge of

the field for white. Green alone seems to fall short of the edge of the white field by about 5°.

I have spoken of areas of two or more centimetres square. But this is not accurate. At each distance from the centre at which the colour can be seen in an area of a certain dimension, the same in the radial and in the concentric direction, it can be seen equally well if the radial dimension is only two thirds of the concentric dimension. For instance, on the outer horizontal radius, red can be seen when an area 3 cm. square has its inner edge on the 70° circle. The colour can be seen equally well if the area three centimetres in the concentric direction is only two centimetres wide, *i. e.* in the radial dimension.*

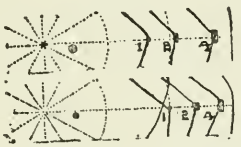
The influence of area is more easy to ascertain than is that of illumination. It is, moreover, of far greater practical importance, on account of the difficulty of securing conditions of illumination sufficiently constant for comparison, and of obtaining colours in sufficient saturation. Of objects readily obtained, only the petals of flowers will bear reflected sunlight. Pigments are apt to reflect so much white light that the colour is invisible.

I have spoken of the mysterious way in which peripheral vision seems, in the higher centres, to be dependent on mutual co-operation, that in neither eye can peripheral vision occur unless the centres of both hemispheres are active, while in the central region there is vision in both eyes although only the higher centre in one hemisphere is active. This peculiar mutual influence of the centres is exemplified further by the colour-fields. The field for every area is larger if both eyes are open. This seems natural so far as concerns the part of the two fields which overlap. But it is true also of that temporal part of each in which the field is single. Binocular intensification extends into this part, and extends into it in the same degree as in the part where the fields are double. For

* Other interesting facts regarding the relation of the shape of area to perception of its colour are still under investigation.

instance, let us take the outer (temporal) horizontal radius of the right field (Fig. 3). In the single field (*i. e.* with the right eye only open, A) in one individual red is seen in one centimetre square at 42°, but in the double field (*i. e.* with both eyes open, B) it is seen at 60°, although the left field only extends as far as 56°. In a square of two centimetres, red is seen in the single field at 62°, in the double field at 72°, and in a square of four centimetres it is seen in the single at 80°, while in the double field it can be perceived almost up to the edge at 90°. The fact that in the part of the fields in which each is single there is increased sensitiveness when both eyes act, gives addi-

FIG. 3.



The outer horizontal radius of the right field, with the position on it of the limit of the red field for 1, 2, and 4 cm. sq. A. With the left eye closed. B. With the left eye open. The dotted lines are at 30° distance.

tional emphasis to the strange fact that, in this region, loss of one higher visual centre causes peripheral blindness. It shows how complete is the blending of function in the two centres. In this outer periphery vision is impossible unless both higher centres act, but where the rays of coloured light fall on one retina only, their effect is greater if the other eye is open, and is greatest if both centres are fully stimulated. Further researches show that there is a remarkable extension of each areal colour-field* if a small white area is in the central region, and that this extension is almost the same if it is opposite the left eye only. That is, simple increased stimulation of the

* The term areal colour-field is convenient as a designation for the field in which colour can be seen in a given area. Of course every colour-field is really "areal," dependent on the area from which the rays proceed.

more sensitive central part of either retina augments the sensitiveness of the periphery to colour, and augments it equally whether it is the same or the other eye which is thus stimulated. A wide field for investigation is opened by these facts. Other interesting relations that have been ascertained are as yet too partial to make it worth while to describe them here.

Sight and movement.

The relation of sight to movement of the body is one of the obtrusive facts of animal life. I remember once watching a flock of wild swans on the river Axe, slowly moving on the stream, in uniform position. Suddenly a small dog appeared on the bank a hundred yards away. Instantly every head was turned at the same angle, every neck was curved and inclined in the same manner. The uniformity was an instance in which the separate mechanisms of life act with a precision comparable to that of connected machinery. The same visual impulse caused the same movement in every swan. In man the relation of sight and motion is familiar enough in normal action, but disordered action makes it more conspicuous. It is presented to us in isolated form by some cases of epilepsy, in which a visual sensation precedes the motion which constitutes the fit. Moreover, instead of motion that can be seen, there may be merely a tendency to motion, only enough to be felt. The motion is often that of turning; the sense of motion is then called vertigo. Hence the study of the relation may teach us something of vertigo.

There are two primary movements of the body—progression forwards and rotation, walking and turning. The latter, in epilepsy, is the result of unequal activity of the centres in the two sides of the brain. If both sides act equally there is no turning; if one side acts more, or only, there is turning from that side, first of the eyes, then of the head, and lastly of the whole body. In epilepsy there is generally such greater action on one side,

and therefore there is this rotation, seldom of the whole body, commonly of the head and eyes, and it is often associated with a visual sensation.

Under normal circumstances such rotation is due to the appearance of some object at one side of the field of vision. An object comes into view on the left side, for instance, because it is moving towards the right. The impulse from the retina thus caused acts chiefly on the right hemisphere. The visual process arouses the motor centres on that side ; the eyes and head turn towards the left to "fix" the object. But the object is moving towards the right, and the first movement to the left is followed by a movement towards the right, due to the left hemisphere, to follow the object, until it disappears at the right edge of the field of vision. Then this long movement to the right is followed by a return to the mid-position by the action of the right centres. Note this alternation, and its necessary relation to the stimulation of the visual centres of one hemisphere from the opposite side,—motor action first in that hemisphere, then in the other, and lastly again in the one first active. Note that the second movement to follow the object is the longer, the more extensive in its range. After the object has passed the central region, from the periphery of the right field the visual impulse will act chiefly on that hemisphere. Such alternate activity is seen in disease, and often in association with discharge of the visual centres.

Almost the first medical observation I published was that of a man with traumatic meningeal hæmorrhage over the left hemisphere. He had repeated convulsions, right-sided, which I watched for hours. In each the head and eyes turned strongly to the right as the fit came on. But this was preceded by a movement to the left, and this again by an initial slight deviation to the right. We have here, from irritation of one hemisphere, precisely the sequences just described. But compare with that active irritation the following case. A boy, at the age of five, had sudden left hemiplegia during a severe general

illness. Partial recovery was followed by recurring convulsions of the left, hemiplegic side. Each fit began thus : a slight movement of the head to the left, a much stronger and longer movement of the head towards the right, then a deviation again to the left, intense, as the boy passed into the convulsions. Here we have again the same sequence, and here we have an opportunity of discerning more of the process. The patient came under observation as a most intelligent boy of eleven years of age, and described the following warning. The figure of a man suddenly made its appearance at the extreme left of the field, slowly moving towards the right. He felt compelled to try to look at it and to follow it, and did so until it disappeared at the right edge of the field. Then he lost consciousness, and knew nothing of the subsequent strong deviation to the left in the fit. The movement to the right impressed his consciousness, and was felt as conscious turning to the right, as vertigo. Here, then, we have these sequences distinctly associated with the action of the visual centre, and, apparently, with the influence of this on the motor centre. Yet one other case. In this, each fit was preceded by the sudden appearance of a blue light on the left side, sometimes of two or three, near together. These always moved slowly towards the right and a little upwards, and the patient felt compelled to follow them. The head and eyes were moved towards the right in this effort, as far as they could be, by strong tonic spasm in the muscles of the neck. This occupied about thirty seconds, and then suddenly ceased on the disappearance of the visual spectrum. The eyes and head, thus released, could be moved from the right, but this movement was continued towards the left as an involuntary movement, which was, however, far greater in the eyes than in the head. For nearly a minute the eyes were turned extremely towards the left, and the head only halfway from the mid-position. During this time he could move the head towards the right, but was absolutely unable to move the eyes from their extreme deviation to

the left. Then he lost consciousness and the general convulsion of the fit came on. We have here again the same sequence, but the convulsion was not left-sided, it was general, and the final left-sided deviation of the head had not the intensity which accompanies a left-sided fit. I could give other similar instances, but these may suffice to indicate the close relation of the movement of the head and eyes to activity of the visual centres. I may point out how indispensable, for understanding the facts, is the theory of the representation of both fields in the higher visual centres and of their mutual action. We must conceive that the activity of the motor centre, caused by a sensation related to the opposite edge of the field, has a stronger action on the motor centre of the same hemisphere, and that the sensation connected with the side of the field which corresponds to this hemisphere, has a less action. Yet the absolute gradation and relation of the sensation and motion is compatible only with visual centres functionally one.

Micropsy and macropsy.

The visual spectra,* especially spherical lights, may seem to come nearer, or to recede. In the same way, objects that are actually seen may seem to approach or become more distant. The increased distance is associated with diminished size and sometimes with dimness of sight, but a few patients whom I have closely questioned have been confident that the apparent increase of distance was not the result of any indistinctness of vision. It may be that there is an associated change in the position of the eyeballs, such as occurs when the object becomes more distant, or that there is a similar

* I have striven in vain to find a word to serve as a general designation for these subjective visual sensations, which would have any chance of currency. "Spectrum" has other and very definite associations. "Spectron" is impossible because "spectrum" is not Greek. "Visum" would be correct and simple, but is so unfamiliar, and so destitute of associations, that I cannot persuade myself it would come into use.

change in the functional state of the centres. The apparent approximation generally goes on until the object seems so near as to overwhelm the patient, and then consciousness is lost, while the apparent recession of objects passes by indistinctness to the same condition. It would seem as though the processes of discharge and inhibition may each have a peculiar form in which objects that are seen are perceived as nearer or further, with augmentation or diminution of size. This condition is of interest as possibly comparable to the sensation of movement which results from an activity of the motor centres too slight to cause actual movement.

II. Migraine.

From the visual spectra of epilepsy we may pass to those of migraine, those which occur as the premonition of the headache called, from the vomiting so often accompanying it, "sick headache," and also known, from the affection of sight, by the suggestive popular name of "blind headache." These constitute the second group of subjective sensations. The two groups present a marked contrast in most of their features, and yet are not without common features and connecting forms. The epileptic sensation is extremely brief, and is followed by loss of consciousness or convulsion. The migrainous sensation is deliberate, slow in evolution, occupying more minutes than the seconds during which the epileptic sensation exists. It is followed, not by a convulsion lasting minutes, but by a headache lasting hours. Yet, just as the epileptic sensation may occur alone as the slightest form of attack, so the spectrum of migraine may occur alone, without succeeding headache.

Not only are these sensations longer in duration, but they present peculiar forms. The elementary features of the migrainous spectra are very few, although their combinations are most varied. They are always simple, in the sense that they are low in the scale of sensation in its relation to mind. No visions of faces, or objects, or

persons, or places, ever precede the headache. Yet the sensation, simple in character, is elaborate in form, the simple elements, developed in the most complex combinations, give rise to spectra that are extremely curious, and will one day, I doubt not, be most instructive. For this instruction, much observation and comparison of facts is necessary. All I can hope to do is to stimulate others to the minute observation and description through which alone, at some time, it may be possible to discern the meaning which the phenomena must have, a meaning as profound and important as it is now mysterious. Our knowledge of these spectra dates chiefly from the careful description of his own sensations by Dr. Hubert Airy, which appeared in the 'Philosophical Transactions of the Royal Society' for 1868. The plates have been reproduced in Dr. Liveing's admirable treatise on Megrim, a book which will be regarded ultimately as one of the medical classics of the century. To these must be added the excellent but brief account of the phenomena given by Dr. Latham in his book on the disease. I am very fortunate in being able to show you to-night a series of other drawings, unpublished, which Dr. Airy has made of his sensations, accompanied by notes taken at the time. Another series of drawings of great value has been kindly made for me from his own sensations by a distinguished water-colour artist, Mr. B—. The peculiarity of the type of sensation and their manifest accuracy, render these very important. Besides some other miscellaneous sources of information I must mention especially the illustrations from which one of the series of diagrams is made. In the year 1879 a man named Beck, aged sixty years, came under my care as an out-patient at the National Hospital for the Paralysed and Epileptic, and remained so until his death, about five years later. During those years he was subject to the frequent appearance of visual spectra, very like those of migraine, but never attended with headache. He was not an educated man, but was a mechanical engineer and mechanical draughtsman. He was an

inventor; his great inventive subject was new kinds of taps, but as far as I could learn the taps could only be turned on so as to empty his own pockets, and could not be turned off. Beck was possessed with the idea that these spectra were objective things, and he delighted in depicting them in the fashion of an engineering draughtsman. The result was the book which I hold in my hand. It contains a number of illustrations of these various appearances, manifestly far too mechanical, and yet executed with a precision which makes them in some points trustworthy. They are accompanied with some rather quaint descriptions, in which it is easy to discern a definite degree of aphasia. I could not very well read them to you, even if I had time, on account of the too appreciative epithets applied to myself. Perhaps the least objectionable of these, written seventeen years ago, is "the venerable Dr. Gowers." The great desire of poor Beck's last years was that the book should be brought under the notice of the Queen. Perhaps, if he had been conscious of the due relations of things, he would have recognised that the next best thing would be for his book to be brought under the notice of this Society. I have gained permission from Dr. Airy to present his drawings to the Society, provided they can be so displayed as to be available for study, and I propose also, on the same condition, to ask the Society to retain the drawings of Mr. B— and the curious record which John Beck has left of his experiences. These constitute a collection of facts unique in their character, and it may be reasonably hoped that this collection may attract other representations, which will constitute a source of information the importance of which cannot but increase with increasing knowledge.

Special features of the spectra of migraine.

The spectra of migraine present as their most important feature the zigzag or angled character, which is well known, in its curved form, as the "fortification spectrum."

Its projecting and re-entrant angles bear a resemblance to the plan which the French engineer Vauban first devised as the most effective for the defence of a fortress. The second peculiar feature is the combination of this angled spectrum with loss of sight, generally bounded by the luminous zigzag, or definitely related to it. The spectral appearances perceived by Beck form a curious exception to this rule. They were never accompanied by any dimness of sight. The angled line of light is seldom straight in its direction. It may form an angled sphere, or an expanding circle or oval, which becomes incomplete, or a curved line. It is seldom a single line; usually the chief line is repeated within its concavity, never on its convexity, by lessening lines, which seem to be fading reflections, approximating so as to blend as they fade into the area of loss within. But in this reflection, as it were, the lines which constitute the angles are reproduced in a peculiar manner—very beautifully shown in Dr. Airy's drawings. The angles correspond in relative size, enlarging in the same proportion as the spectrum expands.

But these angles become progressively less towards the end of the line which is nearest the central point of the field. Their junction is not always exact. They may even so meet as to intersect, and form a complex interlacement, a sort of *chevaux de frise*, very strikingly depicted in some of Mr. B—'s drawings (Pl. III). In these the double or multiple rows give rise to a peculiar appearance. This angled opposition of direction will, I think, be found important whenever the time comes for the mystery of this form to be unravelled. I can offer no explanation for the contrasted direction of these lines, nor do I think that any explanation has ever been given. The conjecture has, indeed, occurred to me that the form may be due to some struggle, or, if the expression may be pardoned, harmonious discord, between the higher visual centres in the two hemispheres, for it seems to me difficult to doubt that, in these spectra, both higher centres

are concerned. One strange feature which Mr. B—'s exact observation has noted as frequently observed by him, is that, at the place where the intersecting lines reach their chief development, small circles of light occupy the interspaces between the crossing lines. They are not coloured, although there is a trace of colour, red and blue, in the lines between which they lie (Pl. III, fig. 2).

Colour in migrainous spectra.

The frequency with which colour is seen in the angled spectrum varies. It may be transient or persistent; it may be occasional only, and then is slight, and confined, as in Mr. B—'s experience, to trifling gleams where the angled element is most developed. It is most unusual for it to attain the extent and degree depicted in the diagrammatic drawings of Beck, and yet the care with which he has indicated its variations, and also the unusual isolation of his spectra, prevent us from dismissing his representations as too formal to be devoid of some weight. In the trustworthy drawings of Dr. Airy not only is colour, as in Mr. B—'s figures, perceived chiefly in the part of the spectrum in which the angled character is conspicuous, but it is confined to the part of the angled spectrum to which the most intense luminosity is apparent, *i. e.* to the outer edge. It must be noted that here we have a very strong bounding luminous line (Pl. I), while in Mr. B—'s spectrum (Pl. III, fig. 2) the chief development is by multiplicity of intersecting lines. In the former the colour is present only in these boundary lines, and is strong. In the latter it is present in the second and third layer of intersecting lines, but is faint. Another feature is shown in Dr. Airy's figures: the colours always differ in the adjacent slopes of the lines. The contrasted direction of the lines is associated with a contrasted colour. We have, however, only four—red, blue, green, and orange; but we *have* four, and not the three or the six colours to which they

are ultimately reduced in current theory. We must not, indeed, push too far such evidence, which can only rest upon memory. Still, the elaborateness and precision of Dr. Airy's drawings and the fact that the notes were made at the time, and the observations with purposed care, give them, I think, very great weight. We must remember that we have here to do with the "spontaneous" action of the brain, but that this is in the centres excited by the influence of light on the retina. Every colour—that is, every varying rapidity of the waves of light—induces the impulses which pass along the optic nerves; these impulses from the retina and the processes in the centres, must present a close correspondence—at least in variation. All we know of colour is due to these impulses, is due to the activity of the centre produced by them. This activity must vary, in a degree as inconceivably minute as that by which the waves of light differ, and yet absolute in its influence on consciousness, through and by which alone colours are distinguished.

Forms of angled spectra.

To reduce to any instructive order the various forms which the angled spectra assume, I have found to be impossible. All I can do is to group them into what seem the chief classes into which they may be provisionally arranged for the convenience of study, and to point out the manner in which the leading elements are presented by each. Some general facts may be noted. The central region seems that in which there is least tendency to the discharge which causes a luminous appearance. The spectral light becomes gradually less as it extends into the central region. Inhibition involves this part, but discharge has a manifest tendency to avoid it or to lessen near it. This is the opposite to that which we should expect. We should anticipate that where function is most acute and intense, spontaneous over-action would be most readily produced. The spectra may develop at the

periphery, but if we divide the field into the three zones mentioned at the beginning of this lecture, we shall find that the middle zone and inner part of the peripheral zone are the regions in which the phenomena occur in greatest development. Yet there is no limitation. Various forms invade all regions, except that which is immediately around the fixing point. The chief forms seem to me to fall into the following provisional classes—each presenting the angled character: (1) the Angled Sphere, mobile or fixed; (2) the Expanding Spectrum; (3) the Progressive Curve; (4) the Lateral Spectrum; (5) the Secondary Limiting Spectrum; and (6) the Concentric Spectrum, with, as its variety, the Arched Spectrum. I will begin with the first.

The angled sphere.

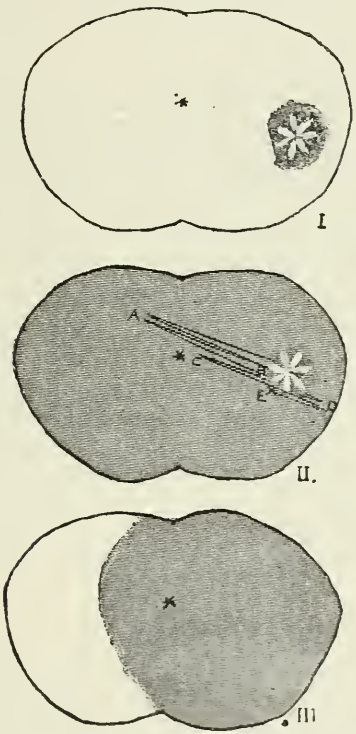
This is a nearly round spectrum composed of a series of projecting angles, plain or coloured. It often has a dark background, not much larger than itself. In every form the luminous spectrum seems to be composed of minute brilliant points in rapid movement. This feature is common to the intense lines and to the fainter luminosity.

This angled sphere, in the form we are now considering, does not change its size, but disappears as it appears. It is met with in three associations: (1) as an object which moves to and fro; (2) as an isolated initial spectrum before some other; and (3) as a terminal spectrum, thrown off, as it were, by that which has developed before. It may, indeed, not be terminal, but a transient incident in the course of an expanding spectrum.

As a mobile object it was the feature of a curious case in which migraine passed into epilepsy, by no means a rare event. Before both the migrainous headaches and the epileptic fits, a round object appeared in the right half of the field below the horizontal line (Fig. 4, 1). It was composed of about six pointed projections which had one unusual feature (at least, as far as could be ascertained

by careful questioning). They were pointed towards the centre (Fig. 4) as well as outward. They were described as alternately dull red and dull blue, and appeared on

FIG. 4.



Mobile angled sphere preceding attacks of migraine and epilepsy. I. A sphere composed of leaf-like projections, alternately red and blue, appearing on an area of darkness. II. The spectrum caused distress and closure of the eyes, the darkness behind being then less conspicuous. It at once began to move forwards and backwards to A, and then from C to D, finally disappearing at D. The eyes being then opened (III), vision was found to be lost in the region of the field the spectrum had traversed.

a black background. This angled sphere moved slowly towards the left, inclining upwards, so as to pass above the fixing point, to a little beyond the middle line, then

returned to its starting-point, retraced this path once or twice, and then passed to the right edge of the field, keeping in the same direction, so as to come near the edge of the field at the lower outer part. Then it passed back again, only to a little beyond the spot at which it appeared, and then returned to the edge; after two or three repetitions of the last course it suddenly disappeared at the spot at which it commenced. The patient kept the eyes shut during its appearance, but on opening them when it had gone, always found she could only see in the part of the field through which the spectrum had not passed. If she looked at a face a couple of feet from her she could only see the person's ear on her left side, and all that was to the right of the ear could not be seen; in only the third of the field to the left was there vision. The loss of sight lasted about a quarter of an hour, and gradually passed away. It is an instructive instance of the relation of the inhibitory loss to the region of the field in which the spectrum appears. The case shows how the central disturbance, though primarily unilateral, ignores the medial hemiopic line.

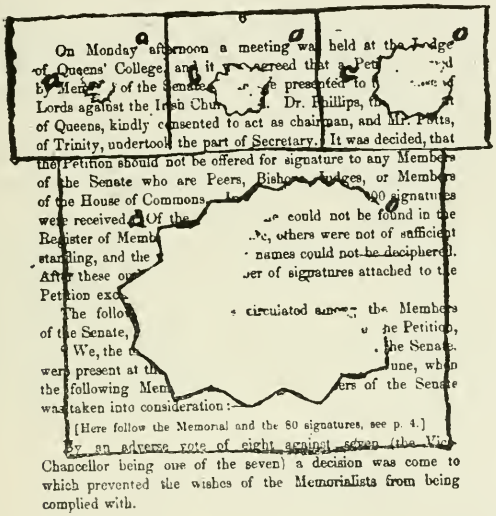
The transient angled spheres will be mentioned with the spectra to which they are related.

The expanding sphere.

The most frequent form of migrainous spectrum, that which is commonly regarded as the typical one, is an angled sphere which expands into an irregular oval, and, breaking, may enlarge into a curve. The stellate sphere appears on one side of the field, nearer the centre than the periphery. Its boundary outline retains the angled form, and this extends and increases in the size of its angles, most towards the periphery. Within it vision is dimmed or lost—the appearance being that of a cloud against bright light, but a luminous obscuration of a dark object. This is well shown in Pl. II, fig. 1, in which the expanding spectrum, bordered by colour, is seen partly against dark

and partly against light. As expansion progresses the obscuration, at first uniform, becomes less towards the centre, and the neighbourhood of the break may be clear. This is well shown in the accompanying figure, in which Dr. Airy has represented the obscuring effect of the expanding spectrum on a printed page.

FIG. 5.


On Monday afternoon a meeting was held at the Lodge of Queens' College, and it was agreed that a Petition ... by Members of the Senate ... be presented to the House of Lords against the Irish Church Bill. Dr. Phillips, the President of Queens, kindly consented to act as chairman, and Mr. Potts, of Trinity, undertook the part of Secretary. It was decided, that the Petition should not be offered for signature to any Members of the Senate who are Peers, Bishops, Judges, or Members of the House of Commons. ... 900 signatures were received. Of the ... could not be found in the Register of Members, others were not of sufficient standing, and the ... names could not be deciphered. After these ... number of signatures attached to the Petition ex... The follo... circulated among the Members of the Senate, ... the Petition, We, the ... the Senate were present at th... June, when the following Mem... ers of the Senate was taken into consideration:—

[Here follow the Memorial and the 80 signatures, see p. 4.]

By an adverse vote of eight against seven (the Vice-Chancellor being one of the seven) a decision was come to which prevented the wishes of the Memorialists from being complied with.

Within the boundary zigzag the outer lines may be repeated, sometimes many times, with the semblance of reflection admirably depicted in Dr. Airy's drawings, in which this spectrum was the common form. It is shown in Pls. I and II. Colours are common in the outer line, and present the features mentioned. This form is accurately depicted by Beck as a faint spectrum, usually colourless, though colours were so conspicuous in most of his visions.*

The expanding oval never reaches the centre of the field. It breaks, and either the lower limb passes far

* His very interesting drawings can be examined in the library of the Ophthalmological Society.

away from the fixing point, while the other is directed towards it, or both pass beyond the fixing point (Pls. I and II). In either case the zigzag becomes narrower and its angles smaller in the limbs formed by the rupture, especially in that which is directed towards the fixing point. In this they may cease to be recognisable, and this narrowing line always ceases before the fixing point is reached—a curious illustration of the resistance to discharge in this region (Pl. I). Sometimes there is no complete oval, only a curved segment, as in Pl. II, fig. 3. When such an expanding spectrum passes beyond the fixing point, dividing, as it were, for the purpose, the terminal angled sphere may develop. Just beyond the ends of the broken oval, towards the end of the period of discharge, a stellate spherical spectrum may appear, like that from which the expanding zigzag arose. It may be transient, or, if terminal, may remain, always unchanged, until the spectrum fades. It seems, as it were, an abortive attempt at a repetition of the process, as if in the other hemisphere, but it is too curious to justify even speculation.

The progressive spectrum.

An angled spectrum, like that which results from the rapid separation of the limbs of the expanding form last mentioned, may arise by progressive extension through a curve in one half of the field, at the outer part of the middle or inner part of the peripheral zone. It presents features remarkably different from the expanding sphere, the ultimate form of which it resembles. A typical example is given in the careful drawings of Mr. B— (Pl. III), in whom it occurred in the same way, sometimes in one and sometimes in the other half of the field. There is no inhibition within the curve, as in the form last described. Its stages are shown in the successive figures of Pl. III. The first thing is a zone of darkness in the periphery of the lower quadrant. Then, above the inner part of this,

a small, colourless star or angled sphere appears. This is an example of the initial sphere, but there is initial disconnected inhibition outside the place at which it begins. It vanishes when, from its neighbourhood (not from its actual place), there develops a curved series of angle lines, small, and often intersecting. Their progress is upwards in a path concentric with the edge of the field, and they may extend for a space as a sudden, straight, flash-like line, to resume the more deliberate zigzag form. The spectrum may pass beyond the middle line, in slight degree, in the upper part of the field, but attains its chief development in the upper quadrant of the side on which it commenced. There it presents the intersecting lines and small circles already mentioned, with slight tints of colour, chiefly red and blue (Pl. III, fig. 2). The constancy in this case of the form of the spectrum, its limited range, and the relation to it of the peripheral loss, and its competent observation, render the case one of unusual importance. It is hoped that additional observations may be presented to the Society at a future time.

The limiting spectrum.

The central region, as I have said, seems to possess peculiar resistance to discharge, although prone to inhibition. In the forms we have considered, in which it is in direct relation to a primary spectrum, the inhibition must be regarded as secondary. In one instance, carefully observed on himself by a member of our own profession, pure central inhibition was sometimes experienced, and was often limited by a spectrum in a very instructive manner. At the fixing point, a small, round or oval spot of darkness would suddenly appear, enlarging and becoming more intense at the centre (Fig. 6, A). Its increase extended the loss of sight through the medial third of the field, from top to bottom, as simple loss. On each side it was then bounded by a soft edge which had the shape of a double curve (B), and in this form it remained, until with the onset

of the headache it passed away. (You can scarcely fail to note how such a peculiar symmetrical medial loss of sight illustrates the essential unity of function of the higher visual centres.) But on many occasions the development of this spot of darkness was soon arrested on one side or the other,

FIG. 6.

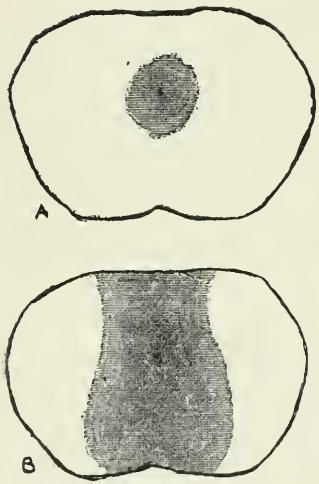


FIG. 7.

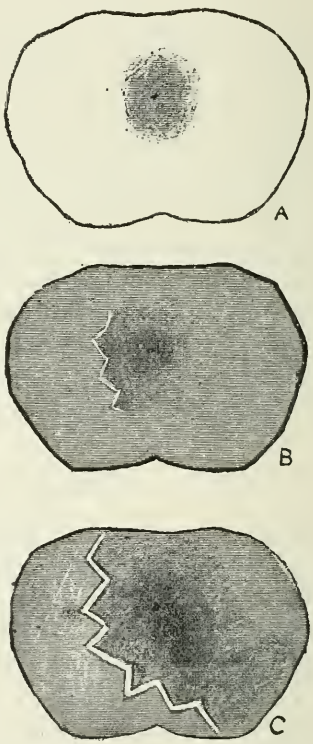


Fig. 6.—Medial inhibitory loss of sight, before headache, beginning as a spot around the fixing point (A), and then extending from the top to the bottom of the double field (B).

Fig. 7.—From the same case. A. Central inhibitory loss around the fixing point in the double field. On account of the distress caused by it the eyes were closed, but the central blackness was still distinct on the dimmer background, and became limited by a zigzag line of light (B). This increased in brightness and width, the angles remaining little changed (C). A limiting line of greater darkness was distinct on each side of the line of light, and the inhibitory darkness extended farther towards the opposite side of the double field.

always on one side only, by discharge. When the spot (Fig. 7, A) had extended through about half the vertical dimension of the field, a bright angled line appeared on one side, without colour, but limited by a narrow, black line on each side of the bright line (B). The zigzags which composed this were few and not regular. The central cloud increased, and reached from the top to the bottom of the field; as it increased, the zigzag became more extensive (C), but did not move much beyond its first distance from the medial line, as if it constituted an obstacle to the development of the loss which it limited. On the other side, however, the loss spread rapidly and further than when there was no discharge, so that the ultimate result was extensive loss, bounded by a luminous line on one side, not far from the medial line, but on the other reaching almost to the edge of the field. The appearance of the spectrum and inhibition shown in the figure is such as to suggest a relation between them. It is as if the resistance by the discharge had caused the inhibition to spread and diffuse itself over a much wider area. Symbolical as the words may seem, it is possible that they may be not far from the truth. Whenever this angled line of light appeared, the severe headache which followed was always on the side opposite to the spectrum, whichever that might be.

Pericentral and arch spectra.

Although spectra do not develop at the fixing point itself, a spectrum around an object which occupies the fixing point is occasionally seen. A good illustration of this is presented in one of Beck's drawings, which is, I do not doubt, in this point quite trustworthy. A zigzag coloured spectrum suddenly surrounded a plate on the dinner-table before him. The quaint description he gives of it is this: "I remember well the phenomena appearing on the plate when I sat down to dinner with two friends. As I looked curious and nervous, Mrs. B— said, 'Why do you not carve?' On taking my eyes off the plate I

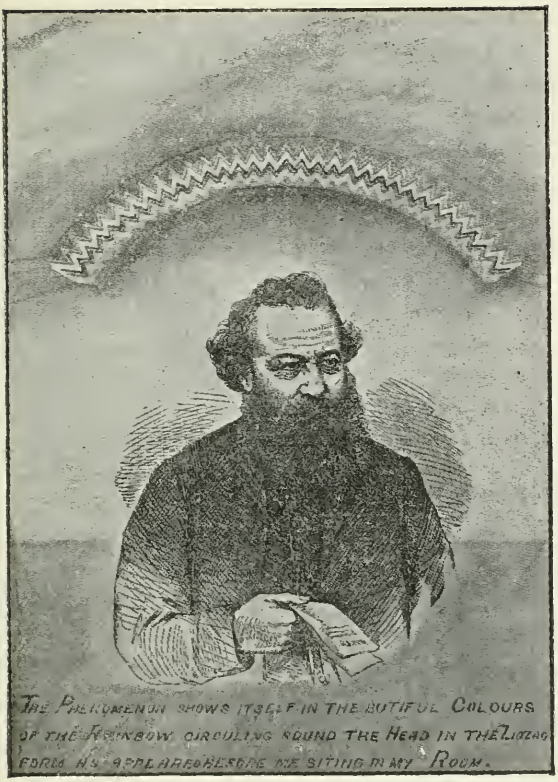
said to them, 'The zigzag rainbow colours are gone out of the window.' This was the first time my wife and friends believed I saw something very extraordinary." One drawing* shows the coloured angled spectrum surrounding the edge of the plate, and another the same circular spectrum in a pane of the window at which he looked up. Concentric with the plate as first seen, it maintained the same form when he raised his eyes to the window, and then disappeared. This fact is more important than may at first sight appear, because the spectrum was evidently determined by the actual stimulation of the visual centres.

A spectrum in the form of an arch, in the mid-position, above the centre, was also a frequent experience of Beck, and may be regarded as a segment of a pericentral spectrum. He has given a representation, of which the adjacent figure is a reproduction. In another drawing it has become divided in the middle, with further loss of some of the constituent colours on each side, a curious symmetry. Other figures represent an analogous arch as it appeared to him when lying in bed. In these forms we are compelled to think of the perfect conjunction in action of the two higher centres.

Another form of this arched spectrum is shown in one of the diagrams as a sort of angled crown above the eye. It is a curious illustration of the tendency to regard these spectra objectively so conspicuous in Beck's representation. The patient was a member of our own profession, and, in response to my request for a drawing of the aspect the spectrum presented to him, he sent me an objective representation of his eye with the spectum above it, in the position in which it could only be seen by another person. This involuntary sense of objectivity is a very curious feature. It is, as we shall presently see, especially strong when the spectrum is at the periphery, in the part of the field where vision is least distinct. It may be that

* To be seen, with the rest of Beck's curious drawings, in the library of the Ophthalmological Society.

FIG. 8.


THE PHENOMENON SHOWS ITSELF IN THE BEAUTIFUL COLOURS
OF THE RAINBOW CIRCLING ROUND THE HEAD IN THE ZIGZAG
FORM AS APPEARED BEFORE ME SITTING IN MY ROOM.

Arched spectrum (with the colours of the rainbow) as represented objectively by Beck.

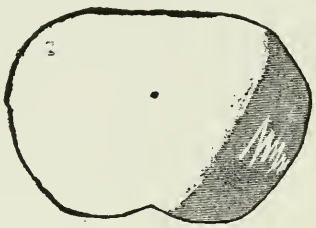
a vivid sensation, where sensation is normally so dim as to be scarcely recognisable, seems so anomalous as to appear, by compulsion, objective.

The lateral spectrum.

One of the simplest forms of angled spectrum is that which appears at the periphery of the field, always at the outer side. It may be a short series of angles, straight or inclined, at the temporal edge of one field. When straight it is of necessity short. An example of this is

shown in the adjacent figure (Fig. 9). This is a reproduction of a diagrammatic drawing made by the patient, with only the difference that he represented the spectrum as beginning at the extreme edge of the field and passing

Fig. 9.



beyond it. An area of darkness was perceived at the outer lower part of the field, and within this a bright zigzag of uncoloured light. Its direction was oblique, nearly corresponding to that of the longest diameter of the field.

Such a peripheral angled spectrum sometimes extends in a curve. Instead of progressing in an upward direction, as does that described as the "progressive spectrum" in the middle zone, this peripheral spectrum always curves downwards. This was one of Beck's most frequent experiences, and is shown in several of his curious figures. They also illustrate the tendency for such spectra to occur, in a similar manner, sometimes on one and sometimes on the other side, in corresponding form. His figures also show the strong tendency to regard a spectrum, which appears in the periphery of the field, as at the extreme edge, even when it is so far from the edge as it must be to permit of extension outwards. Beginning near the edge at the horizontal level, the downward curve carries it into the widest part of the peripheral region. The strong tendency to regard it as objective is aided by the greater extension of the field in this part, and the greater distance of the objects seen in it. A spectrum seen against distant objects seems itself

distant, and therefore extensive, as these curious drawings abundantly show. You will also observe in Beck's drawing of what he regarded as the elementary forms of his "phenomenon," a small lateral spectrum as attached to the outer junction of the eyelids. This is another illustration of the apparent objectivity of the sensation. In the case just mentioned the oblique lateral angled spectrum (Fig. 9) was drawn by the patient as commencing just within and extending beyond the limit of the field. It is clear that a spectrum may seem as if it were quite at the margin of the field, when it is at least fifteen degrees within the edge. The impression is perhaps connected with the vividness of the sensation, as already mentioned, and partly with the progressive extension. But the sense of objectivity, in relation to the conditions of the sensation, requires special study.

This is indeed true of every feature of these phenomena. I have only touched upon the margin of the subject of this lecture. I have had to omit many things that I purposed bringing under your notice. I have notes, more or less full and careful, of many cases of these migraine-sensations. But the collection of facts specially for this lecture—the comparison of their features, and the attempt to discern those that seem to be of most importance, absolute and relative—revealed, to my regret, the inadequacy of the earlier records. They showed once more that facts can only be usefully ascertained, for any special purpose, with that purpose before the mind. But my hope is that what I have done may serve as a beginning, that it may constitute a nucleus around which facts may gather, —facts carefully recorded, carefully scrutinised, carefully sifted, and carefully classified. Only by such a collection of facts and observations, with discernment of their character and relations, can come, in time, any real knowledge regarding them. At present the features are mysterious; but mystery often depends on isolation. The comparison of an adequate number may reveal the significance which is too profound for our present recognition.

If I have opened the path for the more systematic study of this self-revelation of cerebral function, and if only the path thus opened is traversed by others, I shall feel that to-night's Bowman Lecture may stand among the few that have come before, and the many which we trust that future years will bring—will bring to the science of another day, from speakers and to hearers who are still to be.

PLATE I

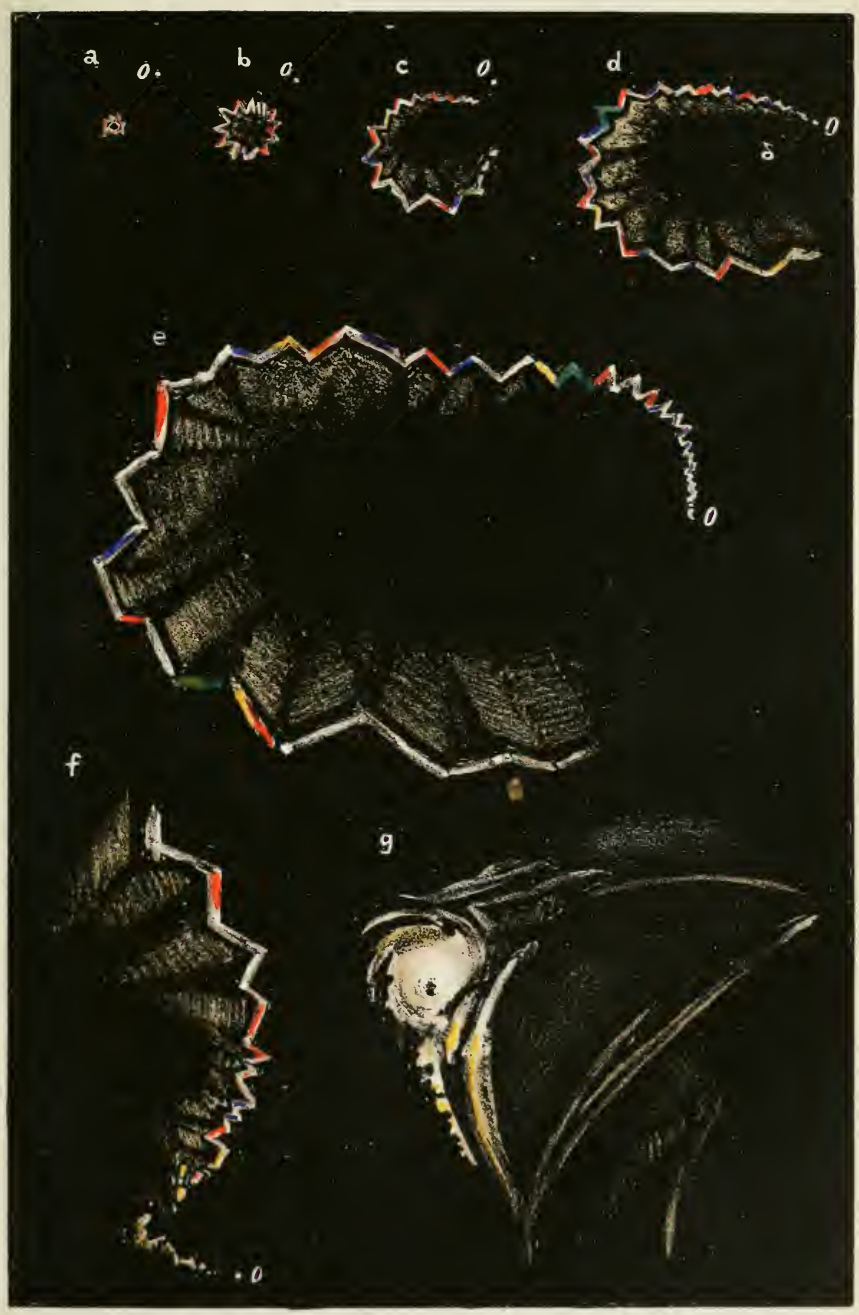
Illustrates Dr. Gowers's paper on Subjective Visual Sensations (see p. 28).

Expanding Spectrum (Dr. Airy).

The successive stages of the typical form, as seen in the dark, are shown in the figures *a*—*g*. In each, (*o*) is in the position of the fixing point, of which long experience of these spectra enabled Dr. Airy to feel sure even in the dark.

(*a*) Earliest stage, a minute stellate sphere below and to the left of the fixing point (*o*). A trace of colour is visible. (*b*) Expansion three minutes later. The spherical outline is still unbroken, although its angles are fainter on the inner side. The colours are more marked, and within the outer line a faint luminosity can be seen.

(*c*) Six minutes from the commencement. The outline has become broken towards the medial line, below the fixing point (*o*), and the line nearest this presents smaller angles than the other. This contrast is still more marked in (*d*), nine minutes after the onset. The general expansion has entailed enlargement of the angled constituent lines,—greater the farther from the extremity near the fixing point. A luminous sphere below the end of this limb sometimes appeared for a few minutes, and then vanished—a "secondary angled sphere" (p. 30). This maximum expansion, attained thirteen minutes after the onset, presented only increased size of the angled lines, and not increase in their number. The alternation and irregularity in the colours as precise a representation as possible of what was seen. The luminous appearance within the outer angled line presents the characteristic relation to the lines, which, although not precise, entails the semblance of a reflection, so that dark interspaces are related to the angles, here and there with exactness. (*f*) The irregular form assumed by the angled line in process of disappearance, which occurs (*g*) in a final whirling confusion, so rapid in movement and distracting that only a vague indication of it can be given.



Mintern Bros., Chromo-lith.

PLATE II

Illustrates Dr. Gowers's paper on Subjective Visual Sensations (see p. 28).

Expanding Spectrum.

Figs. 1 and 2 illustrate the effect on vision of the diffuse luminous appearance within the coloured lines, which joining at angles, constitute the expanding sphere. In actual darkness, the relation of this to the lines is as shown in Pl. I, and there described, and as also seen here in Fig. 3. If the background is relatively dark, Fig. 2, the positive light of this luminosity is still distinct, but its interference with sight is perceived as soon as it comes in front of a lighted surface. In Fig. 1 it is seen against the edge of a window, and appears dark against the light, light against the dark. The sharp limitation of this inhibitory discharge to the area just within the angled line is strikingly shown where the edge of the window is seen. In each figure the limitation of the angled line by a dark line is shown, and from the inner line are projections of peculiar character.

Fig. 3.—A form of the expanding spectrum, throughout partial. It begins as part of a circle, and expands as a curve, never reaching the neighbourhood of the fixing point as in the case of the broken sphere (Fig. 1), and yet presenting the same progressive diminution of the angles in the limb directed towards the central region. Such an imperfect form of this spectrum was extremely rare in Dr. Airy's experience.

Fig. 1

Fig. 2.

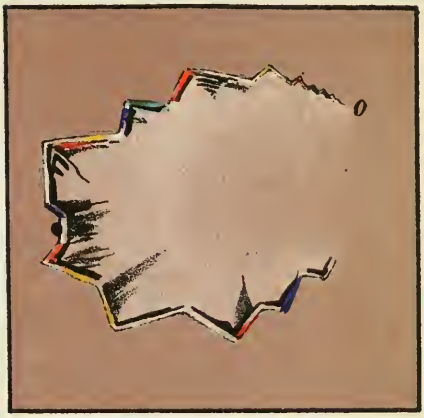
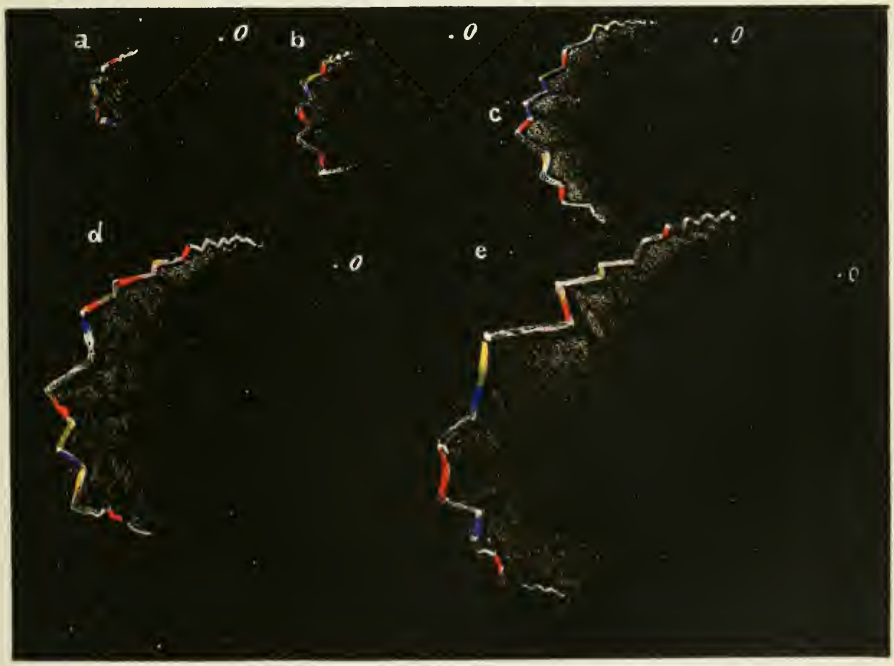


Fig. 3.



Mintern Bros. Chromo lith

PLATE III

Illustrates Dr. Gowers's paper on Subjective Visual Sensations (see p. 30).

Progressive Spectrum.

The figures represent the successive stages of the visual prodroma of migraine in the case of Mr. E. H. B. The duration of each stage was about five minutes. The figures are reduced from the original drawings ; each represents the combined visual field : the tint is a suggestion of that perceived when the eyes are closed in a light room.

Fig. 1 shows the initial dimness in the left lower part (the tint of which should have been a dark grey). This was immediately followed by a stellate sphere, adjacent but separate. This disappeared, but from its neighbourhood a luminous zigzag suddenly developed and ascended within the peripheral zone of loss, now more extensive. The angled line of light afterwards extended up suddenly and then developed, in the same zone of the upper quadrant, into a series of angled lines, interlacing, with faint indications of red and blue on the outer lines. (The colours are exaggerated in the drawings ; they are most carefully depicted in the original drawings, which may be seen in the library of the Society). Between these crossing lines small circles of light, uncoloured, were seen (Fig. 2) ; within this developed spectral curve, a faint reticulation of luminous lines was seen. The part first evolved then became faint and disappeared, the peripheral loss becoming slight and narrow (Fig. 3), although the spectrum, when most elaborate, remained in restricted extent. As it lessened (Fig. 4) a fresh development downwards occurred, a faint inverted recrudescence of the primary appearance, but with continued diminution of the peripheral loss. Finally all vanished as intense headache began in the opposite temple.

Fig. 3.

Fig. 4

Fig. 1

Fig. 2.

Mintern Bros. Chromo lith.

REPORTS.

I. DISEASES OF THE EYELIDS.

1. *Nine cases of chancre of the eyelids and conjunctiva.*

By Simeon Snell.

1. The first case occurred in a young woman æt. 21, and the situation of the chancre was at the internal canthus. It involved also both eyelids, each being affected as far as the punctum, the lower more than the upper. The caruncle and the conjunctiva in the immediate neighbourhood were also implicated. The sore was the size of a shilling, with a scanty, hardly purulent discharge, and with well-marked and raised edges, surrounded by much induration. The gland in front of the ear and the submaxillary glands were indurated. She was a nurse-girl, and the inoculation was apparently brought about by a scratch received from a syphilitic infant who slept with her. Secondary symptoms appeared. The case was reported in the 'Transactions' of this Society for 1883. The following facts in the after history of this patient and of the child that was the source of the affection may be recorded. The patient was at the time of inoculation engaged to be married, and the marriage had been intended to be celebrated immediately. Some time since (1892) I managed to find her again. It seems that in consequence of what was said to her the marriage was postponed until April 27th, 1883—that is about nine months from the time of her first coming to me. She has had

six children. She has never until the last gone to full time with any of them. The first was born at seven months, the second at eight months, and the next three were also premature, and there was a miscarriage between the fourth and fifth babies. The sixth child is living, and is now aged 3½ years. She was a healthy child until she was about ten months old, when she suffered from convulsions, and has since then been paralysed on the left side. There have been no subsequent pregnancies. The patient herself is well, and by no means as old-looking as her age. Beyond an attack of rheumatic fever her health has been good. The healing of the chancre has left some epiphora, but apart from this, to the casual observer, it has occasioned but little alteration. There is no evidence of the husband having suffered at all from syphilis.

The infant who had occasioned the inoculation was brought to me suffering from diffuse keratitis. This was in June, 1889. She has subsequently become afflicted with the deafness met with in cases of inherited specific disease. She has an almost typical appearance of face, crushed-in nose and teeth. The history of syphilis in the father (he is now deceased) is complete, and the mother was syphilised before she became pregnant with this last baby. The father died in 1885, and there were no children subsequent to the one specially mentioned.

2. *Chancre of eyelid.*—The next is a man æt. 30. He came to me at the Infirmary on September 20th, 1887. He was a labourer, married, with a family of five healthy children. He had had acute rheumatism, but, as far as could be ascertained, no other illnesses. Three months before, he says, he fell in the killing shambles, and struck the right side of his face against one of the sewer grates. A small wound was inflicted on the right upper eyelid. As this bled, he bathed it with his handkerchief, which he dipped in one of the buckets standing near, containing water stained with the blood of animals which had been

killed. This is how he accounts for the inoculation, and a more easily understood method cannot be ascertained in his case. The next day the wound had healed, and was thought nothing more about. It remained well for a month; then a little spot (a "powke") appeared on the site of the old wound, and spread until it reached the condition it was in on his coming to me at the date mentioned. There was then an oval ulcerated surface with raised edges and indurated base, occupying the whole of the outer surface of the right upper eyelid; it measured an inch and a half in the transverse, and an inch in the vertical diameter. Secretion from it was scanty. There was no pain. The pre-auricular and a cervical gland were both indurated on the right side. Under treatment (mercurials) the ulceration of eyelid healed. The patient suffered among other things whilst attending under my care from an eczematous condition of penis and scrotum. I mention this because it was ascertained later that his wife came to the Infirmary in June, 1888, giving a history of having suffered a month previously from lumps in the groin, followed by a rash on the arms and face, and later by ulceration of the tongue.

3. *Chancre of inner canthus.*—A man æt. 55 (John P—) applied to me at the Infirmary on January 24th, 1890, for an ulceration situated at the right inner canthus. This had commenced, he said, about a fortnight before as a small speck. It was now the size of a sixpence, and involved both eyelids; the base was indurated, and this became more marked later on. The ulcer after he was first seen somewhat increased in size; it was situated at the junction of the eyelids, but it chiefly affected the lower one. There was some discharge from its surface. The pre-auricular gland was indurated. He was treated with antisyphilitic remedies, and in about six weeks the chancre was healed. In the meantime a rash had appeared on the scalp of a specific character. Inquiry failed to elicit any recognised means to account for the

inoculation. It was, however, ascertained that he was living at a model lodging-house, and the arrangements allowed ample opportunity of infection, for he asserted they only had four towels for about eighty people.

4. *Chancre of conjunctiva.*—B—, æt. about 28, came to me in September, 1892, with an ulcer on the ocular conjunctiva just in front of the plica semilunaris. The pre-auricular gland as well as the submaxillary was enlarged and indurated. I regarded this as a chancre, but no mode of infection was discovered, and his attendance ceased too early for secondary symptoms to have appeared.

5. *Chancre of upper eyelid.*—Lily W—, æt. $2\frac{1}{2}$, was brought to the Infirmary on October 18th, 1892. She had whooping-cough at the early part of this year, but recovered from it about the beginning of June. Some time after this she got some "powkes" at the edge of the left upper eyelid like styes; she had two or three at a time, they kept coming and going. It was after one of these "powkes" that the ulceration of lid began. This was about seven or eight weeks before the date of her coming to the Infirmary. The ulceration extended quickly, and now the whole of the lid was involved. It measured fully $1\frac{1}{4}$ inches wide and $1\frac{1}{2}$ inches vertically. The upper margin of the ulcer presented a crescentic hard indurated edge. There was only a scanty discharge. The ulcer reached to and involved the edge of the lid, and the child could with difficulty separate the eyelids at all. The pre-auricular gland was indurated. There was no rash on the body. A boric acid lotion was applied, and subsequently grey powder given internally.

The mother had a rash, and so had her baby. The latter was ten months old, and had a coppery rash on head and face and neck, and this had existed for three weeks.

Mother had a rash all over—covered from head to foot. Hair had fallen off. The rash came out three weeks

after confinement. She was very poorly before it came out. It had just gone away.

6. *Chancre of upper eyelid.*—Annie E. G—, æt. 4, was admitted an in-patient at the Sheffield General Infirmary on July 16th, 1894, with a sore on the centre of the right upper eyelid. It was reddish-looking with a smooth surface and hard base, a little bigger in size than a shilling; the pre-auricular and submaxillary glands were enlarged and indurated. Two months later the child developed condylomata about the anus and vulva.

The treatment consisted of Hyd. c. Cret. internally, and the application of boric acid lotion to the ulcerated surface. The sore quickly showed signs of healing.

The mother was under treatment at the Infirmary in July of the preceding year (1893) for chancre of the vulva, and the father had previously had a sore on the penis.

7. *Chancre of lower eyelid.*—William G—, æt. 29, a bricklayer, was admitted into the Sheffield General Infirmary on August 1st, 1894, with a red, raw-looking sore on the right lower eyelid, and involving also to some extent the face below it. It had a hard base, and measured $1\frac{3}{4}$ inches horizontally and $1\frac{1}{4}$ inches vertically. The glands beneath the jaw and in front of the ear were enlarged and indurated. The sore commenced about the middle of the previous May as a little pimple about the size of a pin's head, increased until it was as large as an egg, and then it burst and discharged a good deal.

The only history obtained was that about the end of the preceding March he got a scratch on the site of sore from a piece of brick. It broke the skin, making a short scratch, but how the inoculation was brought about could not be discovered.

He was ordered Pil. Hydrarg., gr. ij, t. d. s., and boric acid lotion to the sore, and under this treatment healing commenced, and rapidly progressed.

On November 5th it was noted that a brownish-looking scar is left where the sore had been. There is injection of palate, fauces, and tonsils, but there has been no rash on his body.

8. *Chancre of palpebral conjunctiva (cul-de-sac?).*—John R—, æt. 20, became an in-patient on October 27th, 1894. The lower lid of right eye was red, thickened, and somewhat projecting. It felt as if there was some hard solid substance in the sulcus between the eyelid and globe. On everting the lower lid, which the induration rendered difficult, the inner surface, and especially at the sulcus, was observed to be thickened and projecting, and had a somewhat reddish appearance, interspersed here and there with patches of yellow. In front of the ear and behind and beneath the jaw are hard, enlarged lymphatic glands, moveable and not tender. On September 10th, 1894, he got some coal into his eye, and it had to be removed from the sulcus between lower eyelid and eyeball. It left a sore place, and then the lower eyelid began to enlarge. After about three weeks matter began to come away, and at the same time the gland in front of his ear enlarged. A fortnight since he noticed a lump underneath the jaw. He has had no sore nor rash.

9. *Chancre of outer canthus and both eyelids.*—Carrie W—, æt. 11, was brought to the Sheffield General Infirmary for the first time on November 16th, 1894, with a large ulcerated surface on the left side, involving the outer third of both eyelids, being rather more extensive on the lower lid. It reached outwards towards the temples. It was about the size of a shilling. The edges were indurated, and the pre-auricular gland was enlarged. At this time there was no rash nor other constitutional symptoms, but they developed later. She had inflamed eyes three months ago, and then this sore began; it was not noticed first as a pimple, but as a sore.

No history of the mode of inoculation could be obtained

further than the fact that her parents resided only three doors away from Annie E. G— (Case 6); and though this circumstance was not known until some time later, inquiries elicited the fact that the children played together and went into each other's houses. The opportunities for infection would therefore be many.

Mother is a widow with good health. A daughter's child (nephew to patient) had had an abscess in the groin, but it healed with no induration.

The patient was given 3 grs. of Pil. Hydrarg. three times a day with boric lotion for the eye.

November 6th.—The swollen eyelid is subsiding, and the enlarged glands are less.

In February (1895) the appearances were normal except for faint scarring.

Remarks.—The number of instances of chancre of the eyelids or conjunctiva recorded in the 'Transactions' of this Society are very few. I think the total is only three, and among them is a case of my own (Case 1) to which allusion was made at the outset. In all probability they must be met with more frequently than such a number would represent; for I can hardly suppose that my own experience, though perhaps larger than that of most, is altogether so exceptional. Four of my cases were under treatment about the same time. It is possible that the true nature sometimes has not been suspected, and yet the diagnosis is, generally speaking, not difficult. In all my cases induration of the pre-auricular gland was present, whilst in some also the submaxillary glands were similarly affected. An ulcerated surface of the eyelids or conjunctiva, with induration of these glands, should at once suggest the specific character of the lesion. The implication of the pre-auricular gland may in such a case be regarded as almost pathognomonic. Three of the instances now related were as young as 2½, 4, and 11, and the others were aged 20, 21, 28, 29, 30, and 55. Four were males and five females.

Bulkley, in his invaluable work on 'Syphilis in the Innocent,' has collected from all countries no fewer than 9058 recorded cases of extra-genital chancres. The most frequent among these were those of the lips, breast, and buccal cavity, together making no less than 36 per cent. of the whole number. Chancres on the fingers and hands follow with a percentage of something over five. Those of the eyelids and conjunctiva are next on the list, and are over 4 per cent. The total number of chancres situated in these last-mentioned parts is 372, but it would appear that this number was probably swelled by the outbreak to be now mentioned. "Tepljaschin, a Government physician in Wjatha, reported that in two small villages in Russia having 81 families, with a total population of 532, he found 68 individuals infected with syphilis, 23 males and 45 females; about one quarter of them were under ten years of age. One half of the entire number were infected by a female quack who had followed the industry of removing foreign bodies and treating trachoma with the tongue. This practice is said to be still very common among the ignorant Russian peasants, and to be employed in various eye diseases. This woman became infected in her calling, and pursued it with the results mentioned. Nearly a dozen writers have reported cases of syphilis transmitted by this same method, several of them occurring in this country" (America).

Bulkley's personal cases, numbering altogether 113, included four cases of chancre on the eyelid, three in males and one in a female.*

The difficulty of discovering the exact mode of infection which is observed with regard to extra-genital lesions of this nature in other parts is also to be noted in the instances related by me now. In the first case the inoculation may very well be assumed to have been occasioned by a scratch from the syphilitic infant the girl

* Hill Griffith ('Medical Chronicle,' June, 1886) has recorded twenty-one cases of syphilitic lesions of the eyelids from the Manchester Royal Eye Infirmary; nine of these he regarded as primary sores.

was nursing. In Case 5 the mother and her baby were syphilitic; and in Case 6 both father and mother were so affected. Carrie W— (Case 9) may possibly have been inoculated in some way by her playing with Annie E. G— (Case 6). On this point it may be observed that the date of the appearance of the chancre shows that Carrie W— must have received infection at the time the sore on Annie E. G—'s lid was still unhealed. In Case 3 the use of only four towels for 80 people supplies abundant opportunities for the inoculation being received by this means from an inmate in the lodging-house. The other cases afford no clue to arriving at the source of infection, unless it be regarded that Case 2 was inoculated at the time he received the injury, or by means of the dirty water with which the wound was bathed.

(*June 13th*, 1895.)

Dr. Bronner observed that such cases were not very rare, but the subjective symptoms were often very slight, and the cases recovered without the patients coming to the hospital, or after one or two attendances, before the rash appeared, and the diagnosis was thus confirmed.

Mr. Marshall recalled one case of chancre at the corneo-scleral margin, in a man aged twenty, who came with a small ulcer at the margin of the cornea, the submaxillary and cervical glands speedily becoming enlarged, followed by the usual secondary symptoms of syphilis. This patient was subsequently lost sight of.

Dr. Hill Griffith (Manchester) observed that these cases were only interesting from a diagnostic point of view. He referred to a paper of his in which nine such cases were recorded, and he said that every year at the Eye Hospital they saw two or three of them. He would not make a positive diagnosis of syphilis unless there was an eruption; he would preserve a doubt as to the nature of the sore. Such ulcers might be tubercular, but induration of the glands was never absent in the syphilitic cases. He compared them with vaccine pustules, and said he

had seen half a dozen cases, not yet published, which one would have been tempted to think were chancres. He referred to one such case which was shown to a celebrated surgeon who at once diagnosed syphilis, and was quite surprised on being told that it was a vaccine pustule. The infiltration, however, in the latter case was much greater, and there was much more discharge,—in fact, the inflammation was much more acute. The glands were also enlarged in vaccine pustule. He explained that what he meant was that if the eruption did not appear there would remain a doubt as to the nature of the sore. That did not mean that no treatment should be instituted until this was the case.

Mr. Snell in reply, speaking to the question of diagnosis, said that in the first place one had to deal with a sore with indurated edges, and implication also of the glands. If, under treatment with mercurials, the induration subsided and the ulceration healed, the diagnosis was, he thought, tolerably complete, but of course it was rendered additionally certain by the appearance of secondary symptoms.

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2. *Right eye—primary sore on both lids.*

By Walter H. Jessop.

Charlotte H—, æt. 3, admitted February 18th, 1895.

History.—December 13th, 1894, fell in street; abraded eyelids. Father sucked the wound. Father had mucous tubercle in his mouth at the time, and had chancre July, 1894, followed by roseolar rash. He attended as out-patient at St. Bartholomew's Hospital till October 29th, when, thinking himself well, he left.

Early in January, 1895, pimple appeared on child's lower eyelid, gradually spread, and broke down; upper lid affected at same time.

Patient's condition on admission.—Two superficial sores on eyelids. Extent: upper $\frac{5}{16}''$ × $\frac{12}{16}''$; lower $\frac{7}{16}''$ × $\frac{15}{16}''$. Depth superficial. Discharge thin and watery. Edges: not characteristic on upper lid, thickened on lower. Conjunctivæ not infected. Submaxillary and pre-auricular glands enlarged, shotty, and hard. Rash, roseolar on chest and papular on loins.

Treatment, Lot. Nigra, Ung. Hydrarg.

(*Card specimen. March 14th*, 1895.)

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3. *Complete ankyloblepharon.*

By Kenneth Scott (Cairo).

The following is a somewhat unusual occurrence, and may on that account be worth relating.

My patient was a well-nourished man from Upper Egypt, æt. 50. When first seen the right eye was occupied by a very large rounded tumour, covered by skin, and entirely masking the right orbit: there was no evident appearance of palpebral fissure. The tumour was of a dull red colour, the surface of the skin polished, and showing many superficial, semi-dilated veins. Its diameter measured 4·8 cm. from internal to external canthus, and 3·2 cm. in vertical direction; it projected forwards 3·2 cm. gauged from the orbital margin at the external canthus. It was soft in nature, fluctuating, and very tense; and it, as well as the skin over its surface, moved co-ordinately with the upper eyelid of the other eye. There was no pain or tenderness.

On closer examination a slight trace of palpebral fissure, but without any eyelashes, was found at the extreme lower margin of the tumour, where it joined the ordinary tissue of the cheek.

On questioning the patient he stated that his right eye

had been lost since early childhood, and that a year ago it began to be somewhat irritable, and shortly afterwards assumed in every respect its present appearance; he poulticed it, and the tumour disappeared. The condition recurred similarly after two months had elapsed, and again yielded to poulticing; then it reappeared in the following month and every successive one, and always disappeared after poulticing, until shortly before the time of his presenting himself to me, when every form of treatment for his relief had proved futile.

I concluded that the case was one of total ankyloblepharon, and that the tumour was caused by the retained lacrymal secretion, which had probably undergone a semi-purulent change. This was confirmed on the day before that which had been decided on for operation, by the skin giving way at a point corresponding in position to the centre of the upper eyelid, and the escape of a quantity of semi-purulent fluid, followed by a total collapse of the tumour.

An operation was performed by reopening the palpebral fissure, which was found absolutely closed, and then stitching the edge of the palpebral conjunctiva to the skin. The eyeball was found to be represented by a very small misshapen globe, atrophied and non-irritable. The conjunctival cavity was afterwards kept dilated during healing by suitable dressing, and the man made a good recovery.

I considered that it was advisable to operate on the case, so as to avoid any recurrence of the condition. The parts were too much altered by cicatrisation to allow of any attempt being made to reopen the lacrymal passages.

(*November 8th*, 1894.)

II. DISEASES OF THE CONJUNCTIVA.

1. *Osteoma of the conjunctiva.*

By Gustavus Hartridge.

On May 24th, 1894, R. W—, æt. 3 months, was brought to the Royal Westminster Ophthalmic Hospital on account of a swelling which was noticed three days after birth on the outer part of the right eyeball, and was best seen when the child looked down and in.

On examination a tumour was found to be present on the upper and outer part of the eyeball; when the child looked straight forward the growth was almost entirely covered by the upper lid. The diagnosis then made was a dermoid of the conjunctiva.

The mother said that the swelling was certainly increasing in size; removal of the growth was therefore recommended.

On July 23rd the child was brought for operation. Chloroform having been administered and a speculum introduced between the lids, the growth was more carefully examined. It was found to be oval in form, about 12 mm. long and 6 mm. broad, and situated on the upper and outer part of the globe, between the insertions of the superior and external recti muscles; it commenced about 5 mm. from the edge of the cornea, and extended backwards to the superior cul-de-sac, in which its posterior extremity became lost. The growth was covered by slightly thickened conjunctiva, and appeared moveable on the sclerotic. From its position and

general appearance the evidence appeared in favour of its being fibro-fatty in character rather than dermoid.

During removal the tumour was found to consist of a superficial part, which was soft and moveable; and a deeper part, which was hard and rather closely attached to the sclerotic, requiring careful dissection to detach it. After removal the hard portion of the growth readily separated from the soft portion, and had exactly the appearance of a small central incisor tooth without a fang.

The growth was handed to Mr. John Griffith, who has kindly supplied the following report.

"The appearance of the tissue to the naked eye so remarkably resembled an incisor tooth that the microscope proved serviceable in removing any misconception.

" Prior to microscopy, the aid of a strong convex lens exposed a delicate velvety covering to the tumour not unlike the porcellaneous surface of dental enamel, and which gave a suggestion as to its real nature.

" The firm unyielding nodule was irregularly conical at one end, and enveloped in a fibro-fatty bed. The larger exposed portion took the shape and size of the crown of a human incisor tooth, being somewhat flattened with a broad rectangular extremity. In length it was 6 mm., its broadest end 5 mm., narrowing to 3 mm., and in thickness about 1·25 mm., though it varied in this respect at the two ends of the growth.

" Under the low power of the microscope no doubt can exist as to its osseous nature. It is covered by a fibro-cellular membrane resembling periosteum. The osseous tissue is very dense at the free extremity, and is composed of closely packed Haversian systems similar to those seen in ivory exostoses. The conical portion is, on the other hand, cancellous, and its alveolar spaces contain vessels and are lined by osteoblasts. The contour of the bone is also here irregular, and the cells covering it more numerous. Some of these cells examined by the high power of the microscope prove to be multinuclear, possibly osteoclasts. Canaliculi are in some parts visible, radiat-

ing and branching from the lacunar beds of the imprisoned bone-corpuscles. Both numerous and pronounced are the perforating fibrous bundles which penetrate the bone from the periosteum. The soft tissues in which the bone was embedded are composed of fat-cells, fibrous tissue, and blood-vessels."

Osteoma of the conjunctiva is so rare that this case seems worthy of record.

The literature of the subject is very scanty; but few cases have been reported.

The first recorded case is one by von Graefe in 1863; it was that of a young girl who had for some time complained of a slight swelling of the right upper lid; upon eversion a tumour the size of a small nut came into view, causing a projection near the outer canthus, and extending backwards by a kind of neck. After removal the tumour was found to contain a hard body resembling an incisor tooth 3 mm. in length, and consisting of dense conjunctival tissue studded with osseous nodules in its centre.

A second case of osteoma has been described by Saemisch, as occurring in a young man who complained of a swelling of the right upper lid. Upon examination a projection about the size of a bean was seen between the superior and external recti muscles which extended towards the upper cul-de-sac; the growth when removed measured 9 mm. long, 5 mm. broad, and 3 mm. thick: the tumour was almost completely osseous in the centre, and was enveloped in a conjunctival capsule.

De Wecker had a very similar case in 1878; the osteoma occupied the superior external part of the fornix, and was about the size of a haricot bean; it was adherent to the conjunctiva of the cul-de-sac, but not to the globe.

Its growth was slow, without pain or irritation. Upon examination it was found to consist of dense conjunctival tissue with an osseous nodule in its centre.

In 1882 Loring described a case occurring in an infant

of eight months, and in 1889 Vignes mentioned a case in a child of three years of age.

Mr. Spencer Watson, in February, 1871, recorded a case of ivory exostosis of the sclerotic, which is published in the 'Transactions of the Pathological Society,' vol. xxii, p. 227.

The patient was a boy aged thirteen, and on the upper and outer side of the left eyeball between the insertions of the superior and external recti was a small oval-shaped tumour about the size of a threepenny piece; the growth had only been noticed two months ago, and had been occasionally painful. As it was increasing in size, removal was decided upon. It was somewhat closely attached to the sclerotic. A section of the hard portion of the tumour, which was a flattened disc about the size of a pea, shows it to consist of true bony tissue with Haversian systems; an illustration is given on page 228. No doubt this case is of the same nature as the others that have been recorded.

The 'Transactions of the Ophthalmological Society' contain the notes of two cases; in vol. ii, p. 254, in May, 1882, Mr. Anderson Critchett describes the case of a girl aged eighteen, who had a small well-defined growth midway between the corneo-sclerotic margin and the external canthus; the growth was about the size of a large flattened pea, hard to the touch and slightly moveable under the conjunctiva. This tumour was noticed when the child was three days old, and appeared to remain about the same size till the age of thirteen, when it commenced to grow. After removal the microscope proved it to be of typical bone structure, an excellent drawing of which appears in pl. iv, fig. 2.

In vol. iv, p. 31, in July, 1884, Mr. Snell records the case of a girl aged thirteen, from whom he removed a growth about the size of a small almond, which was situated between the cornea and the external canthus, slightly under cover of the upper lid. The tumour was composed of adipose and fibrous tissue, with a central hard nucleus about the size of a pea; this proved to consist of

true bone covered by periosteum. The growth had been noticed from early infancy.

Thus we have the records of nine cases of osteoma of the conjunctiva; in all, their position on the eyeball was much the same, between the margin of the cornea and the external canthus, slightly under cover of the upper lid. They all occurred in young people, and in several of the cases the growth was noticed a few days after birth. von Graefe's case much resembled mine, the osteoma being described as like a central incisor tooth. They were probably all congenital in origin, with a tendency to increase in size at the age of puberty.

The cases would appear to belong to the group of teratomata rather than to that of dermoids.

(*December 13th*, 1894.)

The PRESIDENT passed round a specimen of osteoma of the conjunctiva removed by him in February, 1868, which he believed he had exhibited at the Medico-Chirurgical Society of Edinburgh. Its structure, formation, and situation coincided exactly with those in the author's case.

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2. *Two cases of membranous conjunctivitis in which Loeffler's bacillus was found; treatment by antitoxin.*

By WALTER H. JESSOP.

CASE 1.—Thomas Fox, æt. 1 year 9 months, was admitted into the Eye Ward of St. Bartholomew's Hospital on November 26th, 1894. He was quite well till November 23rd, when his mother noticed he was fretful, and that his left eye was swollen, and discharged. The next day (November 24th) the left eye was more swollen, and the child took his food badly. On November 25th he could not take his food, and retched on trying to eat; his eye was much more swollen, and discharged more.

The child was pallid-looking but well developed; lips dry; slight croupy cough. No recession of chest, no rash.

Right eye: normal.

Left eye: both lids are swollen and bluish in colour; a thin watery discharge runs from between them. On opening the lids a yellowish-grey membrane is seen covering the upper lid; it is tough, bleeds on removal, and is about one eighth inch thick. The lower palpebral conjunctiva is injected and swollen, but there is no membrane on it. The ocular conjunctiva is much chemosed and congested, but no membrane. Cornea quite clear. Pupil reacts normally. A pre-auricular gland is felt slightly enlarged, and the angular glands are also swollen.

Throat, &c.: the tongue is slightly furred; fauces reddened; a thick patch of membrane is seen on the left side of the uvula running on to the soft palate; tonsils reddened; an ulcer the size of a split pea on left tonsil. The membrane on the uvula is dirty yellow colour, situated on a dark reddened base; it appears tough and uniform in texture.

Patient has been always healthy, and never had diphtheria, scarlet fever, measles, or whooping-cough. No diphtheria in neighbourhood.

3.15 p.m.—Temperature normal. Dr. Hayward has removed membrane from uvula and lid for examination. Injected subcutaneously into right buttock sixty minims of Klein's antitoxin, and thirty minims into the left buttock. Slight swelling over injected areas; punctures covered with isinglass plaster.

November 27th.—Good night, and took food well.

Left eye: membrane on palpebral conjunctiva of upper lid again covers the whole surface; there is a thin membrane over the palpebral conjunctiva of the lower lid: the membrane is not shreddy, but uniform in nature. The ocular conjunctiva is more inflamed and chemosed, but the cornea is clear. The lids are less swollen.

Throat: fauces red and injected. A small patch of

membrane at base of uvula on left side, otherwise the throat appears free from membrane.

Much watery discharge from left eye and left nostril.

The lymphatic glands behind the sterno-mastoids and under angle of jaw enlarged on both sides, but more so on the left.

Urine acid, trace of albumen. Temperature not above normal. Hypodermic injection of Klein's antitoxin (one drachm and a half between the shoulders).

28th.—General condition much improved, sitting up in bed; sleeps well and takes his food. Left eye: membrane much thinner and somewhat shreddy on upper lid; no membrane on lower lid. Throat still reddened, but no membrane to be seen. Temperature subnormal.

29th.—Left eye: lids less swollen. A little grey membrane in two places on upper lid; the lid surface between patches is red; the membrane looks as if it was melting away. On lower lid is a small grey patch of membrane. Dr. Hayward removed the membrane again for examination. One drachm and a half of Klein's antitoxin injected between the shoulders.

30th.—Child looks much better, but has slight cough. No membrane on eyelids or throat.

December 2nd.—Left eye looks quite normal in appearance. Still watery discharge from left nostril, and slight cough. Temperature subnormal; urine 1030, acid, faint trace of albumen.

9th.—The general condition of the child has been good, with the exception of a faint trace of albumen in urine and slight diarrhœa for three days since last note. Last night the temperature rose to 101·6°, and this morning is 102°. There is a small patch of membrane on left tonsil, and the glands of the neck are enlarged again. One drachm of Klein's antitoxin was injected into right buttock.

10th.—Temperature last night was 103°, and now is 102°. The patch on right tonsil has disappeared.

11th.—The temperature fell last night to 99·4°, and is 97·4° now. Child looks much better, and is playing with

his toys; appetite good, and sleeps well. Urine, still trace of albumen.

The child remained in the hospital till December 22nd. The temperature kept subnormal, and the albumen disappeared from the urine on December 18th.

Case 2.—William B—, æt. 8 months, was admitted into the Eye Ward of St. Bartholomew's Hospital on December 7th, 1894. On December 2nd his mother noticed that the child's eyes were inflamed, and at the same time that there was a discharge from the nose. The child was very feverish and irritable.

On admission the child was very irritable and constantly crying. Temp. 98°. The mother is still suckling the child.

Right eye: the lids are somewhat swollen, but very little photophobia. The conjunctival surface of both lids is covered with granulations, and is raw-looking. Upon the conjunctival surface of the lower lid is a white, opaque membrane, not reaching to the ciliary edge; this membrane strips easily, leaving a raw bleeding surface. On the mucous surface of the upper lid is a smaller membrane.

Left eye: the conjunctival surface of both lids is granular as in the right eye. On the upper lid near the inner canthus is a patch of membrane.

There is a thick muco-purulent discharge from the nose, and the child has a slight husky cough. No membrane to be seen on the fauces.

There is no history of diphtheria or sore throat among the other inhabitants of the house.

One drachm of Klein's antitoxin injected into left gluteal region.

December 8th.—Child much less irritable; had a good night and feeds better. Nothing to be seen on the fauces; no nasal obstruction. No recession of ribs; air enters well all over lungs. Eyes: some new membrane has formed where part was removed yesterday for examination by Dr. Hayward—otherwise the condition is

unchanged. One drachm of Klein's antitoxin injected into right gluteal region.

9th.—Eyes : no fresh membrane ; membrane on upper lids beginning to clear. Temp. 98·6°.

10th.—Membrane nearly gone from eyelids. Temp. 99·2°. One drachm of Klein's antitoxin injected into left gluteal region.

11th.—Membrane has disappeared from eyelids, and they are less granular-looking. Temp. 100°.

14th.—Lids : conjunctival surface smooth. Temperature normal.

16th.—Child discharged well.

For the notes of the first case I am indebted to my house surgeon, Dr. Morrison, and for those of the second case to Dr. Morrison and Mr. Adams.

Report on two cases of membranous conjunctivitis (by John Hayward, M.D.).—Case 1. November 26th.—The membrane on the palpebral conjunctiva of the upper lid of the right eye was removed with forceps ; it was stripped off in one coherent piece, leaving a raw bleeding surface. Portions of this membrane were at once thoroughly washed with several relays of sterile salt solution in a test-tube, and one of the pieces taken up on a platinum loop was smeared over the surface of an agar nutrient tube. Using the same needle, two fresh agar tubes were inoculated, and finally two tubes of ox serum (solidified). A diminution of the number of colonies in each tube inoculated is thus obtained.

27th.—Minute colonies were visible on the serum tubes ; on examination these were indistinguishable from *Bacillus diphtheriæ*, presenting the characteristic shape of that organism. A fresh specimen in salt solution showed the bacilli to be immobile. Sub-cultures were made on gelatine, and the subsequent growth was perfectly characteristic.

December 18th.—A guinea-pig, injected with ten drops of a beef-broth culture of the bacillus, died within forty-

eight hours. At the seat of inoculation a serous exudation had taken place in the subcutaneous tissues. Viscera of thorax and abdomen normal in appearance.

Three days after the first bacteriological examination the membrane in the same lid, which was now represented by a mere film on the surface of the conjunctiva, was examined in the same way.

The bacillus was easily recognisable, but the colonies were fewer in number. Ten days later cultivations were again made from the same lid; the conjunctiva was now normal in appearance. No colonies of *Bacillus diphtheriæ* were obtained.

On admission a patch of membrane was present on the left side of the faucial arch. Cultivations were made from a piece of this membrane, and colonies of the bacillus grew readily.

Case 2.—The method of procedure was precisely similar. Characteristic colonies resulted from cultivations of the membrane on nutrient agar tubes and on ox serum. Cultivations were not made from the fauces. Sub-cultures on gelatine showed a similar mode of growth as in Case 1, and bacilli of the same size and shape.

In both cases, in addition to the diphtheria bacillus, a streptococcus grew in abundance, and a few colonies of *Staphylococcus albus*. These were most in evidence on the agar; on the serum no staphylococcus grew at all, and the streptococcus grew proportionately less readily than the bacillus, so that pure sub-cultures were readily obtainable. This is precisely what occurs in bacteriological examinations of the membrane in diphtheria of the fauces; in twenty-five cases which I have examined streptococci were present in every instance, and generally either *Staphylococcus albus* or *aureus*; both streptococcus and staphylococcus grow rapidly on nutrient agar, and tend to overgrow and crowd out the diphtheria colonies. On ox serum the bacillus grows very readily, and this medium seems inimical to the staphylococcus and streptococcus. In this respect ox serum resembles hydrocele fluid,

which I have also employed in cultivating the diphtheria bacillus.

In both cases stained cover-glass specimens were made directly from the membrane. Numerous micro-organisms were seen, including bacilli and cocci, but a certain diagnosis could not have been made from this examination alone without confirmation by cultivation.

These two cases are interesting owing to their rarity in England, and also to the fact that they are the first published cases of membranous conjunctivitis treated by antitoxin.*

I can only find notice of three other cases (one by Uhthoff † and two by Escherich ‡) of membranous conjunctivitis in which Loeffler's bacillus has been satisfactorily demonstrated.

In both my cases Loeffler's bacillus was conclusively found, and the virulence of the poison (Case 1) was shown by its quick effect on a guinea-pig. Both cases had distinct membrane, and in both the palpebral conjunctiva alone was affected. The membrane seemed to melt away, and in neither case did purulent or muco-purulent conjunctivitis follow; the conjunctivæ also presented a natural appearance a few days after the membrane had separated. From the time of first seeing the patient to the total disappearance of membrane was in Case 1 eighty hours, and in Case 2 eighty-four hours. In neither case was any local application except distilled water used.

The antitoxin used was supplied by Dr. Klein, and the first case had three injections (3iss at a time), and the second case two injections (3j at a time). It is very instructive that in the apparent relapse in Case 1, accompanied by fever and a greyish patch of exudation on the left tonsil, Loeffler's bacillus could not be found, though carefully searched for by Dr. Hayward.

* I had not seen notice of Coppez' case in "Le Scalpel" ('British Medical Journal,' 1894, ii, p. 1340).

† Uhthoff, 'Berliner klinische Wochenschrift,' 1893, p. 551.

‡ Escherich, 'Berliner klinische Wochenschrift,' 1893, p. 551.

In both these cases there was a distinct membrane, and therefore they ought to fall under the heading of membranous conjunctivitis. On searching the rather copious literature on the subject it seems impossible to doubt that by most authorities they would be called *pseudo*-membranous or croupous conjunctivitis, in order to avoid their falling under the heading of the diphtheritic conjunctivitis first described by von Graefe.

Mr. Nettleship, in his most able paper on "Diphtheritic Ophthalmia," suggests that no distinction should be made between diphtheritic and *pseudo*-membranous ophthalmia.

I quite agree with him, but go further, and think that the time has come that the term diphtheritic should no longer be used to describe cases of conjunctivitis. It was first used by von Graefe, as all inflammations were then classically divided into catarrhal, croupous, and diphtheritic. The term diphtheritic had thus no necessary connection with the disease known clinically as diphtheria, and is therefore misleading.

Pseudo-membranous or croupous is open to even graver objection, and quite different cases have been arranged under this heading, which seems a convenient term for cloaking ignorance.

All cases of conjunctivitis with membrane are not diphtherial or associated with Loeffler's bacillus; and lately Mr. Vernon has had two marked cases in his wards at St. Bartholomew's Hospital, in each of which there was a distinct membrane, but in neither was Loeffler's bacillus found.

That all cases of conjunctivitis associated with Loeffler's bacillus have a distinct membrane is not yet proved, and further investigation is much needed, particularly as the bacillus is found in affections of the fauces and their membrane.

I would therefore hold that all cases of conjunctivitis with membrane ought to be merged into one class—membranous conjunctivitis or ophthalmia,—and that diphtheria, characterised by Loeffler's bacillus, should be recognised as one of the causes of the disease; or, if preferred,

that membranous conjunctivitis should be subdivided into diphtherial and non-diphtherial (caustics, jequirity, and the micro-organisms).

With regard to the treatment in my cases, the local treatment was simply washing the eyes with distilled water, as the cases could be carefully watched in the wards. As to the action of Klein's antitoxin, the cases thus treated certainly had a very short course, free from any complications. The membrane in both cases seemed to melt away, and in neither did any purulent or muco-purulent conjunctivitis follow.

I cannot conclude without thanking Dr. Hayward for the extreme care and trouble he has taken in the bacteriological portion of this paper, and Dr. Klein for the use of his antitoxin.

(*January* 31*st*, 1895.)

Mr. Mackinlay recalled that some years ago Mr. Tweedy had written a paper on the treatment of diphtheritic ophthalmia by quinine given internally and applied externally to the eye. He used a solution of four grains to the ounce, with just sufficient acid to make it dissolve. He himself had lately had a case in which he hesitated to use antitoxin because he did not at the time know enough about it. He therefore used the quinine treatment, and the patient had done very well, as others also had. This case, however, was not examined in the thorough way that the author's had been, nor was the result so rapid. It must obviously have been the antitoxin in the author's cases, seeing that only distilled water was used as a local application.

Mr. Jessop, in reply, said it was too soon to say anything about the supervention of paralyses. When he first saw the case the membrane was there, so he could not be certain how long it was after infection. He made the injection immediately. He asked whether Mr. Mackinlay's case was one of membrane affecting the cornea. (Yes.) In his cases the corneæ were not

affected, but only the palpebral conjunctiva. It was curious that Mr. Vernon had two cases lately with membrane looking the same as his own, but no Loeffler's bacilli were found, and no antitoxin was used. One of them went on to suppuration, and loss of the eyeball, and in the other the cornea was affected. As a rule these cases did not recover without some serious injury to the conjunctiva, and the membranous stage was usually followed by purulent or muco-purulent ophthalmia. In his own cases the conjunctiva recovered perfectly, and no damage whatever remained. He could not but believe that the actual cure was determined by Klein's antitoxin.

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3. *Case of sudden severe hæmorrhage from conjunctival surface of upper lid.*

By Walter H. Jessop.

Elizabeth J—, æt. 27, was brought to St. Bartholomew's Hospital on March 8th, 1895, in a state of collapse from repeated attacks of severe hæmorrhage from the left eye.

At about 8 o'clock the previous evening (on March 7th) whilst drying clothes there was sudden profuse hæmorrhage from the left eye, which was stopped by pressure in a quarter of an hour.

At 12 midnight, though the eye was bandaged, the bleeding became again severe, but stopped on fresh bandaging and firm pressure.

At 1 p.m. on the 8th the hæmorrhage recurred, and after Mr. Rogers had bandaged the eye up she was brought by him to the hospital.

I saw her at 2.30 p.m., and found her very collapsed, the hæmorrhage having recommenced, and the bandages being soaked with blood. Pulse 130, small, irregular,

difficult to be counted. The extremities were cold, and the pupils were dilated.

On removing the bandages there was profuse bleeding from the left palpebral aperture.

The upper lid was everted, and a small jagged-edged ulcer about 1½ millimetres in diameter was found in the middle of the palpebral conjunctiva. A small bluish vessel led up to it on its outer side; bright arterial blood welled up from the ulcer, but without pulsatile movement.

Blepharal forceps were applied, and the hæmorrhage at once ceased; the ulcer was freely treated with the actual cautery. The forceps were left on for twenty minutes, and then gradually taken off as the lid looked dusky. Cold compresses were applied, and Leiter's tubes.

Fourteen years ago she had erysipelas of the eye and nose on the left side, since which time her left eyelids have been slightly swollen. For six or seven months the left superior eyelid has been a little more swollen, and bluish red in colour.

No history of severe hæmorrhages or of hæmophilia; no accident.

She has been married twelve months, and is a seven months gravida.

March 9th.—Patient feels sick and is weak and giddy on the slightest movement. Pulse 84, very weak and small. Does not look so blanched.

11th.—On removing the dressings some slight arterial hæmorrhage from the palpebral aperture. Leiter's tubes were immediately applied.

12th.—Left upper lid is a little fuller than right; near the ciliary border of the upper lid are some small scarlet capillaries (nævoid).

14th.—The slough has separated from the wound, and on everting the lid there was some slight bleeding.

19th.—Has had no more hæmorrhage. Patient says that left upper lid is not so red as before the bleedings, and that the upper lid was quite normal before the erysipe-

latous attack. At middle of ciliary border of left upper lid are still a few small scarlet vessels; beneath skin of lid are some dilated veins. On under surface of lid is a small white scar; the rest of the conjunctival surface of the lid is a little red and congested. No marked enlarged vessels. No pulsation or thrill to be felt.

The husband writes on April 28th saying that there had been no recurrence of the hæmorrhage, that his wife was recovering from a difficult confinement, and that the female child was now doing well.

This case, from the severe and repeated hæmorrhages, is probably of nævoid origin. To support this theory there were slight nævoid changes in the lid. It differs, however, from cases recorded in the lower lid and other parts by there being no marked sign of vascular tumour. Instead of being a raised patch it was a depressed, jagged-edged ulcer. I find three cases recorded of severe hæmorrhage from the lower lid.

MacMurdo * mentions a case of severe hæmorrhage from the lower lid in a case of granular lids.

Bader † cites a case of bleeding from a small vascular round spot on the palpebral conjunctiva of the left lower lid.

Gotte ‡ mentions the case of a very anæmic young man, who bled every two or three days from the right eye; on the tarsal conjunctiva of the lower lid was a small black point from which arterial blood spouted if the spot was rubbed with the finger nail.

Treves § cites cases of severe hæmorrhage from small tumours of the mouth and tongue, and Mr. Butlin has had a case lately under his care of bleeding ulcer of the tongue about the size of a split pea.

The treatment in the three ocular cases cited above,

* 'Royal London Ophthalmic Hospital Reports,' vol. i, p. 218.

† Ibid., vol. ii, p. 113.

‡ 'Riv. Clin. di Bologna,' vol. xii, s. 770; Nagel's 'Jahresbericht f. O.,' vol. xiii, 1882, p. 492.

§ Pathological Society's 'Transactions,' vol. xxxix, p. 97.

and my own, was the actual cautery; in the last case it stopped the hæmorrhage.

For the notes of the above case I am indebted to my house surgeon, Dr. Morrison, and the dresser, Mr. Andrews.

(*May 2nd*, 1895.)

Dr. Sydney Stephenson said the case resembled in some respects one under his own care. The patient was a girl of eleven with trachoma, corneal ulceration, and pannus. He had performed the operation of expression, during and after which blood escaped from the eyes, nose, and mouth. The bleeding continued during the following month, now from one eye and then from the other, on an average every other day. He had been unable to identify the spot from which the hæmorrhage proceeded. The conjunctiva as a whole was turgid, and nothing could be seen. It continued for five months and then ceased. On many occasions the girl had bled as often as eight times in the twenty-four hours, and twice the loss was estimated at about half an ounce. He thought at first that it was a case of simulation, but bleeding recurred under circumstances which quite excluded that idea. The girl showed no signs of scurvy, rickets, or anæmia. Hæmorrhagic diathesis seemed to be excluded by the fact that an accidental cut on the forehead and the extraction of a molar tooth had not been followed by unusual hæmorrhage. On the other hand, there was a history of swelling of the knee-joints, and that condition had recurred on three distinct occasions.

Mr. Jessop, in reply, said the important point in his case was that there was no sign of any tumour, only a sharply-cut ulcer with granulation tissue springing from its base. Possibly there might have been a vascular tumour which had come away, but of this there was no direct evidence.

4. *Result in a case of pemphigus of conjunctiva (exhibited at the Society, June,* 1893).

By R. Marcus Gunn.

For former conditions *see* 'Trans. Ophth. Soc.,' vol. xiii, p. 30.

At that time (June, 1893) there was much general corneal haze (epithelial). The cornea is now quite clear. There is slight conjunctival injection. On the inner surface of the left upper lid are one or two scars.

L. E.: V. $= \frac{6}{6}$, Hm. 1 D. Reads J. 1 easily.

(*Card specimen. January* 31*st,* 1895.)

Mary. H Brooks del

Fig. 1

Fig. 2.

Fig. 3.

Fig. 4

DESCRIPTION OF PLATE IV.

Fig. 1 illustrates Mr. Treacher Collins's paper on Discoloration of the Cornea with Blood-pigment (p. 69).

Fig. 2 illustrates Mr. Marcus Gunn's case of Peculiar Variety of Lamellar Cataract (p. 119).

Fig. 3 illustrates Mr. Marcus Gunn's case of Coralliform Cataract (p. 119).

Fig. 4 illustrates Mr. Marcus Gunn's case of Traumatic Subluxation of Lens, Secondary Zonular Cataract, and Coloboma Lentis (p. 121).

III. DISEASES OF THE CORNEA.

1. *Discoloration of the cornea with blood-pigment.*

By E. Treacher Collins.

(With Plate IV, fig. 1.)

In October, 1890, I brought before this Society two cases of a peculiar form of discoloration of the cornea with blood-pigment. Three cases of a similar description had been previously published by Vossius, and one by Lawford; since then two others have been recorded by Weeks of New York, and John Griffith. I have now the notes of nine more to add to these. A study of the seventeen cases has enabled me to write a fairly complete account of the affection, and as a description of it has not yet found its way into the text-books on eye disease, I think it will be interesting to members of this Society, to read to them the result of my extended inquiries into it this evening.

The cases so far recorded have all been brought forward by those to some extent engaged in microscopical work, but it must not, therefore, be thought that the condition is only a pathological curiosity. It is one which frequently involves, as all those who have written on it have mentioned, a very nice point in diagnosis; the curious fact being that the difficulty consists in distinguishing it from a condition of a widely different nature. Those who have not seen this form of discoloration of the cornea would hardly believe it possible that it could be confused with a lens dislocated into the anterior chamber, and yet I have seen some of the best observers doubtful in deciding between these two conditions.

The discoloration in all but two of the cases involved the whole cornea, except a narrow ring varying in width

from 1 to 1·5 mm. at its extreme periphery, which remained clear and uncoloured.

In one of the exceptional cases, a coloured picture of which is figured in vol. xi of our 'Transactions,' the discoloured area, though central, is much smaller in extent, and of a very bright hue. This case also presented another point of difference, which I shall have to refer to later on; it is doubtful if it should be included in the same category with the others, though it may be that it is merely a later stage of the same affection.

In the other exceptional case there was a wound in the lower half of the cornea, the discoloration was confined to its upper and inner two thirds, the lower third being entirely clear and unstained, as also was the extreme periphery in the whole circumference.

The colour of the stained portion of the cornea has been described in different cases clinically as greenish black, greenish brown, greenish, rusty brown, and reddish brown. In eyes in which it has looked greenish clinically I have found that it had on section a reddish-brown hue. In one case the section of the cornea was of a bright orange colour. I detached the cornea in one of the specimens from the rest of the globe, and found it presented the same discoloured appearances as when *in situ*.

In all the cases there was blood-clot in the anterior chamber, and in most of them, and probably in all at one time, the clot completely filled the chamber, which was so distended that the lens and iris were displaced backwards, and the angle of the chamber widely opened out.

In some cases, in which the eye had been previously blind for several years with detachment of the retina, the hæmorrhage into the anterior chamber had apparently occurred spontaneously. In others it had followed on injuries of different sorts, in four having been occasioned by the removal of a prolapsed iris.

In nine of the seventeen cases the tension was definitely

increased; in six others, in which it was either normal or *minus* at the time the patient came under observation, the possibility of its having been increased at the time of the hæmorrhage into the anterior chamber cannot be excluded: it is not only possible, but highly probable, for in two of the cases in which it was increased, while they remained under observation it became decreased. Pathological examination of the eyes shows that the increase of tension is evidently brought about by the filling up of the widely opened angle of the anterior chamber with blood-clot, which effectually prevents the exit of intra-ocular fluids at this part.

The discoloration of the cornea is known in one case to have been certainly present eight days after the hæmorrhage into the anterior chamber; in another it was seen thirteen days after; and in a third, fourteen days after.

Through the kindness of Mr. Silcock, who has allowed me to watch one of his cases, in which the discoloration came on after hæmorrhage into the anterior chamber incident on the removal of a prolapsed iris, and where it was not found necessary to remove the eye, I am able to record the rate at which the staining disappears. The cornea in this case cleared from the periphery towards the centre, but the stained area always had a sharply defined edge. It was first definitely noted to be present eight days after the operation. Fifteen days after, the extreme periphery of the cornea in its entire circumference was quite clear. Twenty-five days after, the lower margin of the pupil, dilated with atropine, was just visible below the staining. Two months after, there was still a large central opaque area. Nine months after, the centre of the cornea was still discoloured, but much less densely so. A year after, the central patch was of a grey colour, and measured 4 mm. in diameter. The patient was not seen again until two years and three months after, when the cornea was quite clear.

The discoloration may occur at any age, as shown by

these cases, from fourteen months up to fifty-six years. That it is not altogether of such rare occurrence as the little notice it has up to the present attracted would seem to imply, is shown by the fact that during three years at Moorfields Hospital I met with nine cases of the affection. I find in all of these corneæ, which I have examined microscopically, in the discoloured area a number of highly refracting particles.

In connection with it the following questions present themselves for consideration :

(1) What is the nature of the pigment ?

(2) How does it get into the cornea ?

(3) Why is it found located in a large circular patch in the centre of the cornea, and why is the extreme periphery left clear ?

With regard to the nature of the pigment, Virchow has taught us that in old blood-clots retained in the interior of the body, such as are found in aneurisms, or in the brain after cerebral hæmorrhage, small crystals of a rhomboidal shape and bright red colour are often met with, also an amorphous deposit of the same colour and nature. This substance he has termed hæmatoidin. The size of these hæmatoidin crystals varies considerably, and I have found the size of the highly refracting particles met with in the discoloured corneæ to vary in different cases. In some they have the appearance of little rhomboidal crystals, and in others of the finest dust-like particles. Dr. Halliburton, in his text-book of ' Chemical Physiology and Pathology,' describes hæmatoidin as insoluble in water, alcohol, ether, acetic acid, dilute mineral acids, and alkalies. I have found that sections of the cornea with this peculiar form of staining, after having been immersed in these different solutions, still contain the highly refracting granules as before.

He goes on to state that hæmatoidin is soluble in concentrated acids and caustic alkalies, and that when treated with fuming nitric acid the crystals give the same colour reaction as the bile-pigment does (Gmelin's reaction).

Salkowski found hæmatoidin to be identical chemically with bilirubin. I have not been able to determine if the particles in the discoloured cornea are present after treatment with strong acids or alkalies, because these reagents cause such changes of the tissue as to prevent any further satisfactory examination. With pieces of the cornea from two of the cases and a drop of fuming nitric acid I obtained a beautiful play of colours, passing from green to blue, to red, and then to a bright yellow. The varying colour of the bile-pigment or hæmatoidin in Gmelin's test depends on the different degrees of its oxidation. Supposing this staining of the cornea to be due to the presence of hæmatoidin, as I think I am about conclusively to prove, then we have a satisfactory explanation of the difference in the colour of the stain which has been described in different cases, and also why corneæ, which appeared greenish clinically, on section after hardening were of a yellowish or reddish hue. Halliburton reports that neither hæmatoidin nor bilirubin shows bands spectroscopically, but both possess a strong absorption power for the violet end of the spectrum. I have examined with the micro-spectroscope the stained portion of the cornea from two cases, and there were no bands of absorption whatever to be seen, only absorption of the violet end of the spectrum.

Hæmatoidin is a derivative of hæmoglobin, and is free from iron. I have tested sections of the cornea from four of these cases with ferrocyanide of potassium and hydrochloric acid, and also with ammonium sulphide; the highly refracting granules were not stained black with the former or dark green with the latter test. In two of them, however, though the granules were not stained green, a substance which seemed to be confined to the interspaces between the laminæ of the corneæ was. In the logwood and eosin stained sections of these two corneæ this substance did not show up very definitely, but seemed to stain rather more with eosin, and less with logwood than the surrounding fibrous tissue of the cornea.

Vossius in one of his cases got a reaction with ammonium sulphate, and in the other with cyanide of potash, indicating the presence of iron. Weeks applied to the sections of the cornea from the case he recorded the ferrocyanide test, and states that there appeared to be a faint reaction.

There occurs often, Halliburton says, in connection with blood extravasations and associated with hæmatoidin a substance containing iron, to which Neumann has given the name hæmosiderin. I conclude, then, from microscopical, chemical, and spectroscopical examination of these corneæ that the discoloration is mainly due to hæmatoidin, but that in some of them it is associated with hæmosiderin.

With reference to the second point, the mode of entrance of the pigment into the cornea, Vossius was of opinion that there was direct hæmorrhage into its substance, the blood coming from the vessels at the sclero-corneal margin. If this was the case red blood-corpuscles would be found in the cornea, and the discoloration would occur from the periphery towards the centre. In none of the corneæ I have examined microscopically have I found any blood-corpuscles, and in two cases which were under observation while the discoloration came on, it was noticed as soon in the centre as anywhere else. In none of the corneæ I have examined microscopically were any blood-vessels to be seen, but in the case already referred to as an exceptional one, where the discoloured patch was small and very bright, the lines of old blood-vessels could be seen with the ophthalmoscope and a high *plus* lens, as they are after an attack of interstitial keratitis. The fact of the presence in all the cases of blood-clot in the anterior chamber, alone renders it highly probable that it is the source from which the pigment is derived. Weeks says that it is probable that the pigment entered the substance of the cornea in the soluble form of hæmoglobin, and was there transformed into a salt not soluble in the fluids of the cornea. With this I quite agree, for it is obvious that there is no circulation of fluid in the cornea of sufficient force to

disseminate the particles of hæmatoidin, which are insoluble in water and weak alkalies, throughout its substance. Weeks is of opinion that this hæmoglobin-containing fluid entered the cornea through the spaces of Fontana. Seeing, however, that there is generally increase of tension in these eyes, due to the exit of fluids at the angle of the anterior chamber being obstructed, and also, as I have just mentioned, that the discoloration appears as soon in the centre of the cornea as elsewhere, I think it is more probable that the hæmoglobin enters the cornea by a process of diffusion through Descemet's membrane.

The third point in connection with these cases I wish to deal with is the shape of the discoloured area, and why a narrow ring at the periphery is usually found clear. The explanation is a very simple one. It is that when the whole cornea is discoloured the real nature of the case is not recognised; it is then thought to be one in which the blood entirely fills the anterior chamber. Absorption of the hæmatoidin granules commences at the periphery equally in all directions, and it is not until this part of the cornea has become cleared of them that the fact that the discoloration is really in the cornea itself can be recognised. In the eighth case appended to this paper this point is well brought out. Paracentesis was twice performed, with the idea of evacuating the blood from the anterior chamber, but on neither occasion was any alteration produced in the appearance presented by the eye. Subsequently the entire periphery of the cornea cleared, and the typical appearance which has attracted attention in these cases was produced.

The process of clearing in the cornea gradually proceeds from the periphery to the centre, becoming slower and slower the further removed the discoloration is from the vascular channels at the sclero-corneal margin. We can easily understand that the process is a slow one when we consider that the substance which has to be removed, hæmatoidin, is insoluble in the fluid of

the cornea, and that each particle has to be taken up by a migratory leucocyte.

In conclusion I may point out that this discoloration in the centre of the cornea causes a considerable defect in vision, and that the case I have mentioned in which in the course of about two years it completely disappeared is a very valuable one, for it enables us to prognose ultimate recovery should the other part of the eye not be permanently damaged.

Articles referred to in the paper.

Vossius.—Archiv f. Ophthal., Bd. xxxv, Abth. ii, s. 207.

Lawford.—Trans. Ophth. Soc., vol. viii, p. 60.

Treacher Collins.—Trans. Ophth. Soc., vol. xi, p. 43.

Weeks.—New York Eye and Ear Infirmary Reports, vol. i, pt. 1, p. 37.

John Griffith.—Trans. Ophth. Soc., vol. xiv, p. 74.

Case 1.—Annie B—, æt. 14 months, was admitted to the Moorfields Hospital under the care of Mr. Couper on September 17th, 1891. Her left eye had been struck by a stone three weeks previously.

On examination two nebulæ were seen in the lower half of the cornea, and the scar of a punctured wound in the sclerotic three millimetres below its lower margin. The whole of the cornea, except a ring 1·5 mm. wide at its margin, was of a dull uniform greenish colour; the peripheral ring was clear, and a brownish reflex was seen from behind it. The tension was normal, and as far as could be made out the child was unable to distinguish light from dark with the eye. The following day it was excised.

Pathological examination.—After the eye had been hardened in Müller's fluid it was opened by an antero-posterior vertical section. The anterior chamber was then found to be markedly deepened and full of blood-clot. The lens and iris were displaced backwards, the angle of the anterior chamber being widely open. The

vitreous was of good consistency, but slightly detached antero-laterally. The retina was *in situ*. On section the central portion of the cornea appeared of a rusty-brown colour.

Microscopical appearances.—Scattered throughout the substance of the cornea are seen a number of fine dust-like particles; these do not extend quite as far forwards as Bowman's membrane. Descemet's membrane appears intact. No blood-vessels or blood-corpuscles are seen in the substance of the cornea. There are numbers of red blood-corpuscles in the mesh of the ligamentum pectinatum. The angle of the anterior chamber is widely open.

Case 2.—Thomas G—, æt. 26, was admitted to the Moorfields Hospital on April 10th, 1888, with a wound at the sclero-corneal margin of his left eye from a chip of iron, through which the iris prolapsed. An iridectomy was performed at the seat of the wound, after which there was free bleeding into the anterior chamber. The eye afterwards quieted down, and the blood in the anterior chamber became completely absorbed. A white mass was, however, seen ophthalmoscopically, and it was uncertain whether this was an organised blood-clot or a detached retina; he had no perception of light with the eye.

On May 21st, 1892, he came stating that for the last four days the eye had been painful, though he had had no fresh injury to it. The condition of it at that time was as follows:—The tension was increased; there was a small cicatrix at the upper and inner margin of the cornea. The whole cornea except its extreme periphery was of a greenish-brown colour. Its appearance simulated very much that of a lens displaced into the anterior chamber. There was a small red-coloured hyphæma.

Pathological examination.—The iris was found to be extremely shrunken, and the pupil widely dilated. A large portion of the anterior surface of the iris was adherent

to the periphery of the cornea. There was marked ectropion of the uveal pigment, most of the anterior surface which is left free being covered by the displaced pigment epithelium. The anterior chamber contained some blood-clot and discoloured opaque fluid. The central portion of the cornea, on section, could be seen to have a faint brownish colour. The vitreous was shrunken, and the retina detached from the ora serrata up to the optic disc.

Microscopical appearances.—Scattered in small patches throughout the central portion of the cornea are numerous little highly refracting, fawn-coloured, granules. They are most abundant amongst the anterior layers, and some of them are situated between the laminæ.

In sections treated with ammonium sulphide the granules are not stained, but a substance situated between the laminæ takes on a dark greenish colour. In the logwood eosin stained specimens this substance is stained pink with the eosin. No blood-vessels or blood-corpuscles are seen in the cornea. The root of the iris is much atrophied, and intimately adherent to the periphery of the cornea.

Case 3.—Jane T—, æt. 14, was admitted to the Moorfields Hospital, under the care of Mr. Tweedy, on July 12th, 1892. The evening before she had been struck on her left eye by a hammer. There was a small wound in the upper part of the cornea, with a prolapse of the iris and an hypopyon. The prolapsing iris was cut off, after which the anterior chamber filled with blood.

On the 26th it was noted that the eye was still much injected, and that the blood was not being absorbed. The eye-ball was then excised.

Pathological examination.—The tension of the eye immediately after removal was normal. There was a small partly healed wound in the upper half of the cornea. The anterior chamber was full of blood-clot. The central portion of the cornea was of a rusty-brown colour on section; the extreme periphery of it was clear. The lens was *in situ*. There was some blood-clot between the iris and lens.

There was extensive diffuse purulent infiltration throughout the vitreous. The retina was in position, but thickened.

Microscopical appearances of the cornea.—In the central portions of the cornea are numerous, highly refracting, granules which stain darker than the corneal tissue with eosin. They are thickest amongst its posterior layers; none are found situated quite as far forwards as Bowman's membrane. No blood-vessels can be seen in the cornea in the sections examined. Between the layers of the cornea at its extreme periphery, and between the fibres of the anterior part of the sclerotic, are some red blood-corpuscles. The granules are much smaller than the blood-corpuscles. They do not stain black with potassium ferrocyanide and hydrochloric acid, nor dark green with ammonium sulphide. They are still present in sections which have been soaked in alcohol, ether, acetic acid, weak alkalies, and acid.

On applying a drop of fuming nitric acid to a small piece of the discoloured cornea a play of colours was produced.

Case 4.—George S—, æt. 5, was admitted to the Moorfields Hospital, under the care of Mr. Gunn, on November 16th, 1892. Three weeks previously he had fallen down, striking his left eye against a tin whistle. The tension of the globe was *minus*. In the sclerotic, on the inner side of the cornea, was a puckered cicatrix. The cornea itself was of a greenish colour throughout except at its margin, which in its entire circumference was clear. The eye was excised the same day.

Pathological examination.—After hardening in Müller's fluid an equatorial section of the globe was made, and the cornea and sclerotic were peeled off the front half. The ciliary body was found to be intimately adherent to the sclerotic at the seat of the scar. There was a large blood-clot in the anterior chamber, and the lens was wounded. The retina was *in situ*. The cornea, when entirely separated from the rest of the globe, presented the same

discoloration as it did in the intact eyeball. When examined with the micro-spectroscope no absorption bands could be seen; there was only absorption of the violet end of the spectrum.

Case 5.—William B—, æt. 39, was admitted to the Moorfields Hospital under the care of Mr. Lawford on June 15th, 1893. About half an hour previous to admission he was struck on his right eye by a piece of cast iron. On examination a horizontal transverse wound was seen in the outer half of the cornea, and lying in the lower part of the anterior chamber was a large piece of metal. There was no hyphæma. The lens appeared to be wounded.

The eye was at once cocainised, and, after several unsuccessful attempts with the magnet and forceps, the foreign body was removed. Its withdrawal was followed by the prolapse of a large portion of iris, which became torn away from its opposite attachment; the prolapsed portion was cut off. The anterior chamber at once became filled with blood.

On June 21st the following note was made:—Right eye: V. = p. l. Tension slightly more than left. Anterior chamber filled with blood-clot and lens matter; cornea hazy; wound fairly flat; no pain.

On June 26th the tension of the right eye was found to be lower than the left, and it gradually became less.

On the 28th, thirteen days after the injury and operation, the cornea was noted to have a greenish appearance. The eye was excised on July 1st.

Pathological examination.—There was a partially healed wound in the outer half of the cornea. The upper and inner two thirds of the cornea were of a greenish colour; the lower third was unstained, and the iris could be seen through it in that position. The discoloration nowhere extended right up to the corneal margin, but ended by a sharply defined margin a little short of it. After hardening in Müller's fluid the stained part of the cornea appeared on

section of an orange colour, the discoloration extending uniformly from its anterior to its posterior surface. There were blood-clots in the upper and outer part of the anterior chamber. The iris and lens capsule were adherent to the wound; part of the iris and the greater part of the lens was absent. The vitreous was of fairly good consistency, but slightly turbid. The retina was *in situ*.

Microscopical appearances of the cornea.—Numerous fine, highly refracting, granules are seen scattered throughout the substance of the cornea. These granules stain with eosin rather more deeply than the surrounding fibrous tissue; they do not stain with logwood. They do not appear to bear any definite relation to the spaces between the fibrous laminæ, some seeming to lie on the fibres of the cornea. Some are situated between Descemet's membrane and the stroma, and some between the anterior epithelium and Bowman's membrane. A piece of the cornea separated from the rest of the globe was examined with the micro-spectroscope, but no absorption bands could be detected; there was only absorption of the violet end of the spectrum. The granules are not stained by ammonium sulphide, but in sections treated with this reagent a substance between the laminæ of the cornea takes on a dark greenish colour. In the logwood and eosin stained specimen this substance is seen to be stained pink by the eosin.

Case 6.—Patrick K—, æt. 47, was admitted to the Moorfields Hospital, under the care of Mr. Tay, on June 26th, 1893. He stated that for the past five years he had been subject to attacks of inflammation in his eyes, more especially in the right. About three weeks ago he discovered he was unable to see anything with the right eye; he had had no injury to it, and complained of no particular pain in the eye, but had pain at night over the right frontal region. He had never suffered from gout or rheumatism.

On examination of the eye there was seen to be much injection of the superficial conjunctival vessels. The central portion of the cornea was of a dark greenish-black colour. This discoloured part ended about 2 mm. distance from the sclero-corneal junction by a very sharply defined margin. The extreme periphery of the cornea in its entire circumference was clear. The iris could not be distinctly seen. He was only able to distinguish light from dark with the eye, and the tension was +1. His left eye appeared healthy; V. $= \frac{6}{18}$, Hm. 1 D. $= \frac{6}{9}$.

The tension in the right increased to +2; it became very painful, and on July 6th, 1893, was excised.

Pathological examination.—The central part of the cornea showed on section a uniform yellowish-brown discoloration extending throughout it. The anterior chamber was full of bright red blood-clot; it was considerably deepened, the lens and iris being displaced somewhat backwards: its angle was widely open. The vitreous was thin in consistency, and had some opaque filmy streaks in it. The retina was *in situ*, and the optic disc was cupped.

Microscopical appearances.—In the substance of the cornea in its central part are seen numerous highly refracting particles, bearing no definite relation to the spaces between the fibrous laminæ. They are more numerous in the posterior than in the anterior half of the cornea. They are not altered in colour when treated with potassium ferrocyanide and hydrochloric acid, or with ammonium sulphide. There are no blood-vessels or blood-corpuscles to be seen in the cornea. The angle of the anterior chamber is widely open, the iris being displaced backwards. Blood-clot completely fills the anterior chamber, and red blood-corpuscles are seen in the mesh of the ligamentum pectinatum.

Case 7.—Frederick I—, æt. 31, was admitted to the Moorfields Hospital, under the care of Mr. Morton, on July 24th, 1893. He stated that he had been short-

sighted in both eyes for many years. Seven or eight years ago his left was struck with a piece of wood from a lathe, and shortly after went blind. He then attended as an out-patient, and the note on his letter says he had detachment of the retina. Six months ago he had a fresh injury to the same eye from a piece of wood; since then it has been very painful.

On examination of the left eye there was found to be intense injection of both the palpebral and ocular conjunctiva. There was a deep brown discoloration of the central portion of the cornea; the extreme periphery was clear, though a dark reflex was seen from behind it. The tension of the eye was + 1, and with it he could only distinguish light from dark.

Pathological examination of the eyeball after it had been hardened in 50 per cent. spirit.—The anterior chamber was distended with bright red blood-clot. On section of the cornea, the deeper part of it appeared more discoloured than the superficial. The lens was calcareous throughout. The retina was detached from the optic disc up to the ora serrata; it had a cyst protruding from its outer surface. At the upper part, between the detached retina and the choroid, was an opaque gelatinous substance.

Microscopical appearances.—Scattered throughout the central portion of the cornea corresponding to the discoloured area are numerous highly refracting particles, which stain darker than the surrounding tissue with eosin; they cannot be made out to bear any definite relation to the spaces between the laminæ of fibrous tissue. They are most thickly located in the posterior half of the cornea; the position at which they cease in the periphery of the cornea is very sharply defined.

No blood-vessels or blood-corpuscles are seen in the sections of the cornea. The angle of the anterior chamber is widely open, but is completely filled, as is the whole of the anterior chamber, by blood-clot. On applying a drop of fuming nitric acid to a piece of the

discoloured cornea a beautiful play of colours was obtained, passing from green to blue, to red, and then to a bright yellow.

Case 8.—William B—, æt. 17, was admitted to the Moorfields Hospital, under the care of Mr. Silcock, on November 17th, 1892. Two days previously a piece of rivet which he was cutting flew up and struck his right eye. On examination a wound was found in the cornea close to its outer margin, through which the iris, coated with lymph, was protruding.

The patient was at once placed under an anæsthetic, the prolapsed iris was then drawn out as far as possible and snipped off, after which the anterior chamber became immediately filled with blood.

The following are the notes on the course of the case after the operation.

November 19th.—The patient has been sick. The anterior chamber is full of blood ; T. + 3. A paracentesis was performed, and repeated the following day, but on neither occasion was much blood evacuated.

25th.—The tension of the eye is now less than normal. A dull, greyish-yellow opacity, the upper border of which is sharply defined, hides the iris from view ; it is doubtful if it is due to blood-clot in the anterior chamber, or to staining of the posterior layers of the cornea.

27th.—The opaque yellowish material, which is apparently in the cornea, appears to be clearing off. The iris can be seen above it. The anterior chamber as far as can be seen is clear. T. −.

30th.—The discoloration of the cornea is changing to a dull greenish-brown hue.

December 2nd.—The periphery of the cornea is clear, the staining is less dense ; T. −.

7th.—The stained area in the cornea is slowly diminishing peripherally ; its edge remains very sharply defined.

12th.—The stained area is less extensive, though still occupying the greater part of the cornea. The lower

margin of the pupil, dilated with atropine, is now just visible below the staining. The stain is less dense than it was, especially at the periphery. The wound has healed. T. n. V. = hand movement. He was then discharged from the hospital.

January 12th, 1893.—The eye remains quiet; a large central portion of the cornea is still opaque.

August 24th, 1893.—The centre of the cornea is still pigmented, but much less densely so. V. = $\frac{6}{24}$.

November 19th, 1893.—The patch in the centre of the cornea is now of a grey colour, and measures 4 mm. in diameter. V. = $\frac{6}{12}$. T. n.

February 14th, 1895.—The cornea is quite clear.

Case 9.—William J. M—, æt. 30, came as an out-patient to the Moorfields Hospital on March 26th, 1895. He stated that fifteen years previously he had received an injury to his left eye from a clothes-line. A cataract formed in it, which five years afterwards was operated on. He was able to see with the eye for a few years after the operation; the sight of it then gradually failed, and for the last three or four years it had been quite blind. A fortnight ago, without any apparent cause, the eye suddenly became painful, and has remained so ever since.

On examination the whole of the left cornea, with the exception of a narrow ring at the periphery 1 mm. wide, is found to be of a dark red colour. The peripheral ring is clear, but there is a dark reflex from behind it (see Pl. IV). T. n. V. no p. l. Some ciliary and conjunctival injection. Right eye healthy.

April 9th.—The ring of clear cornea at the periphery is slightly larger. The discoloured area is now more of a rusty-brown than a red hue. This circular brown patch with its sharply defined margin looks very like an amber-coloured lens displaced into the anterior chamber. T. n.

May 2nd.—The eye still keeps slightly injected, and is at times painful. The discoloured area in the cornea is

smaller and less dense than it was; red blood-clots can be seen in the anterior chamber.

(*May 2nd*, 1895.)

Mr. Jessop referred to a case under his care at St. Bartholomew's Hospital. The boy had sustained a blow on the eye from a whip-lash. On the second day there was marked blood-staining near the centre of the cornea; the anterior surface of the cornea was smooth, and the anterior chamber contained a good deal of blood. It cleared up in three days.

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2. *Three specimens of blood-staining of the cornea.*

By John Griffith.

Specimen 1.—Right eye removed from an elderly man by Mr. Juler for secondary glaucoma attended with great pain. There was no perception of light; the cornea was a uniform reddish-brown colour. T. + 3. The eye had been blind for some years. The hemisection (horizontal) shows that there is total detachment of the retina, the subretinal space being occupied by some coagulated material. The cornea is stained a nut-brown colour except at its periphery. The anterior chamber is filled with coagulated blood. Lens *in situ*.

Specimen 2.—Left eye excised from a girl, aged fifteen, by Mr. Juler, for persistent hyphæma, secondary glaucoma, and great pain. The eye was quite blind. Her sight in both eyes had been weak since birth. She had had two attacks of "bleeding into the eye," the first occurring two months prior to the permanent attack which necessitated the removal of the eye. Each came

on during a monthly period. Menstruation irregular. In the right eye there was a congenital dislocation of the lens upwards and outwards. The hemisection (vertical) shows slight detachment of the retina. Lens displaced upwards. Anterior chamber filled with coagulated blood. The cornea smoky in appearance centrally, but clear peripherally.

Specimen 3.—Left eye excised from a young girl by Mr. Adams Frost for severe pain. Anterior chamber full of blood. T. +. History of hæmophilia. The cornea looks as if blood-stained. The hemisection (horizontal) shows extensive choroidal hæmorrhage, detachment of the retina, hyphæma, and blood-staining of the cornea. There is in this specimen also a clear zone at the periphery of the cornea. The lens is *in situ*, though somewhat pushed backwards by the blood in the anterior chamber.

The cornea in all three cases showed microscopical appearances similar to those of a case described by me in this Society's 'Transactions' for 1894, p. 74.

Note added.—Mr. E. T. Collins, in his paper this evening, supports my view that the granules in the corneal tissue are hæmatoidin.

(*Card specimen. May 2nd*, 1895.)

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3. *Tuberculous keratitis.*

By Gustavus Hartridge.

Ellen F—, æt. 15. Never had any trouble with her eyes before the present attack, which commenced four months ago, when a brownish spot was noticed in the left cornea at the outer part. The eye became red, but

has never been painful; since this time other spots have formed.

Family history.—Father healthy. Mother rheumatic. One brother died as a baby, cause of death not known. One sister is delicate, but patient can give no information as to cause. Has one cousin, whose chest is weak.

Personal history.—Measles and "a fever" when a baby. Submaxillary glands are at present a little enlarged.

On admission.—Right eye under atropine: V. $\frac{\bar{c}}{+1\text{ D. Sph} \atop +\cdot5\text{ D. cy. axis}} = \frac{6}{6}$. Left eye: V. = fingers at 2 metres.

On the back of the left cornea are seven round spots, varying in size from ·5 to 2 mm.; most of them are of a creamy-pink colour, but two or three are white, the larger ones being more coloured. The margins of the spots, though well defined, are surrounded by corneal haze. The one which is centrally situated projects backwards into the anterior chamber, and apparently touches the capsule of the lens.

Besides these round corneal spots, there are masses of exudation of a pinkish colour in the iritic angle; the largest mass is directly outwards, and the next below. Vessels may be seen coming from the margin of the cornea to some of the spots of infiltration.

Pupil does not dilate well to atropine. By making the patient look down and out it is possible to get a fundus reflex, but no details can be seen. T.n.

It is proposed to remove some of the exudation from the posterior part of the cornea for microscopical examination.

June 1st.—The condition of the eye is distinctly worse, and a small quantity of exudation was removed and stained for bacilli with negative results. As the eye gradually got worse it was removed on June 18th.

(*Card specimen. May 3rd*, 1894.)

Pathologist's report.—The left eye of Ellen F—, excised June 18th, 1894. The jelly preparation demonstrates morbid changes in the iris, cornea, and ciliary body. Some new tissue is also visible in the anterior chamber. The corneal changes are not nearly so pronounced to the naked eye as those in the iris, yet the irregular outline of its posterior surface, combined with the varied degrees of translucency of that membrane, clearly indicates pathological disturbances. The iris on the temporal side is considerably thickened, and near its ciliary attachment is almost five times its natural thickness. This iritic growth appears spherical, is of a pale greyish-white colour, and quite devoid of pigmentation. The pupillary area is closed by a false membrane. The ciliary body appears slightly more bulky on the outer side.

Microscopically the cornea is seen to be infiltrated near its posterior aspect and just within Descemet's membrane with small, round, and deeply staining cells; vessels are seen permeating this tissue. At one place near its centre there is an interruption in Descemet's membrane, and a fibro-cellular tissue connects the substantia propria of the cornea with a similar tissue occupying the pupillary area, and with the iris itself constituting a very definite anterior synechia. In this tissue are seen typical elementary tubercular deposits, *i. e.* local aggregations of epithelioid cells surrounded by a small round-celled infiltration. Giant-cells are seen in some of these tubercles. The iris presents the typical appearance of tubercular iritis. It contains numerous circumscribed collections of epithelioid cells, with internodular tracts of deeply staining cellular tissue supporting blood-vessels. Miliary tubercles are seen in the ciliary muscle, in the ciliary processes, and in the *pars non plicata* of the ciliary body. There is a tubercular infiltration of the suspensory ligament, and the small posterior chamber is obliterated by the growth.

Though attempts have been made to discover the

bacillus by the Ziehl-Neelsen's method of staining, no satisfactory result has been obtained.

Remarks.—The primary intra-ocular seat of the lesion was probably the iris, since that tissue seems most involved; besides, epithelioid cells are here in abundance, and a few giant-cells, whereas scarcely any of these larger cell-elements are visible in the cornea. The histology of the tissue clearly supports, without bacteriological proof, the original clinical diagnosis.

JOHN GRIFFITH.

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4. *Alveolar sarcoma of the cornea.*

By E. DONALDSON, Londonderry.

History.—A stout, healthy-looking countrywoman, æt. 21, consulted me on March 2nd, 1895, on account of something growing on the right eye. The growth of which she complained involved the inner part of the cornea, and extended over the sclerotic for about 4 mm. It was 7 mm. in diameter, and was nearly round. It was greyish, somewhat gelatinous-looking, and smooth on the surface, and was slightly raised above the level of the eyeball. On the inner side of the growth there were a number of large blood-vessels feeding it. Otherwise the eye was not congested. The growth was sessile. It did not interfere with vision, not extending as far as the pupil. There was no pannus, and no ulceration of the tumour. The growth was first noticed nine months before.

After instilling cocaine solution I removed the growth with forceps and scissors. The tissue of the cornea left after growth was removed was transparent. I saw the patient again on March 27th, 1895. There was great

improvement. The cornea was normal. The large vessels at inner part of eyeball had considerably dimin-

Fig. 10.

M. H. Lapidge. × 100.

ished in size. Patient was told to seek advice at once if growth returned.

Description of microscopical appearances of growth by E. Treacher Collins.—The growth is covered by thick laminated epithelium, which has a very irregular base line; the surface cells are dry and scaly. The tumour itself is made up of collections of round nucleated cells (Fig. 10) closely grouped together, in spaces bounded by strands composed of fibrous tissue and elongated cells, in some of which small blood-vessels are seen to course.

(*Card specimen. May 2nd,* 1895.)

5. *Marginal ulceration of both corneæ associated with bullæ.*

By E. C. Fischer.

G. C—, æt. 34, clerk, was admitted to Moorfields Hospital under Mr. Tay on April 1st, 1895, with marginal ulcers. The right eye had been affected for five weeks, and the left for three weeks.

History.—Nothing to account for onset of symptoms. Had been in good health all winter; works long hours by gaslight. Always steady; no history of syphilis; takes alcohol, but not in excess. Married; wife had four miscarriages and two children living, viz. second and fourth. Urine 1012, acid; no albumen, no sugar.

On admission there was a crescentic ulcer on outer and inner margin of each cornea, each ulcer being bounded by a thin grey overhanging margin.

Since admission there have appeared, at varying intervals, four successive crops of minute bullæ on central clear portion of each cornea.

Treatment has consisted of varying applications, all without avail,—*e. g.* nitrate of silver, calomel, yellow oxide of mercury, eserine, atropine, carbolic acid. Quinine, iron, and iodide of potash have been given internally. Paracentesis has also been tried.

(*Card specimen. July 5th,* 1895.)

IV. DISEASES OF THE IRIS AND CILIARY BODY.

1. *On the iritis of the later stages of syphilis.*

By W. A. Brailey.

This communication refers to the iritis which occurs as a late lesion of syphilis, whether congenital or acquired. Such iritis has been referred to by various authors. For example, Fuchs, in his 'Text-book of Ophthalmology,' says, "Sometimes it happens that the iritis [of hereditary syphilis] becomes, comparatively speaking, very conspicuous, while the keratitis attains but a slight degree of prominence, and there may even be iritis without any keratitis." And also, "More rarely the iritis breaks out in the later stages of syphilis."

I wish to put together some facts in regard to cases of pure late syphilitic iritis that have come under my observation. The iritis of late syphilis differs from the best known and accepted form of syphilitic iritis, in that this last occurs some six months after infection as indicated commonly in adult life by the primary sore, and in infants by the date of birth; whereas that I am describing is developed a considerable time later, averaging in adults some thirteen years after the primary sore, and in the subjects of congenital syphilis, though varying within wide limits, some twenty-one years after birth.

My attention was first markedly drawn to the subject by the cases of Mrs. R— and Richard R—, her eldest born. She was sent to me at the age of forty-five with double glaucoma, the immediate result of an irido-cyclitis of five weeks' duration in the right eye and three weeks' in the left. The son, aged seventeen, came shortly after-

wards with double irido-cyclitis of twenty-one months' standing in the left eye, and twenty months' in the right. Though not presenting the characteristic teeth of congenital syphilis, his history, and the fact that his father had syphilis a year before his birth, may be taken as very strongly pointing to syphilis as the cause of the eye affection in both mother and son.

To detail the above cases rather more fully:

In the mother the right eye showed inflammation of iris, a rough triangle of fine greyish dots on the lower posterior corneal surface, and raised tension; and the left eye, inflamed iris, dense haze on the lower half of the posterior corneal surface, and very high tension. Eventually in each eye the tension was checked by iridectomy; pigmented synechiæ made their appearance at the pupillary edge, and the posterior corneal opacity very much diminished.

In the son the right eye had its iris discoloured, with resulting posterior synechiæ of its pupillary margin and pupillary lymph film. The iris showed also several nodular yellowish thickenings of its lower part, leading later to peripheral anterior synechiæ. The lower posterior corneal surface showed greyish, irregular-sized, rounded dots; and similar but vascularising dots appeared deep in the corneal substance. The left eye had the characteristic greyish dots of keratitis punctata on the lower posterior corneal surface, with slight pupillary posterior synechiæ. Also it had vitreous haze, and several small, disseminated, atrophic choroidal patches.

The mother's, then, would be a case of iritis with keratitis punctata,—that is to say, a serous irido-cyclitis occurring some eighteen years after syphilitic infection; and the son's a case of double serous irido-cyclitis,—not, however, unaccompanied in the right eye by some tendency to the appearances of interstitial keratitis.

To continue with cases like that of the mother (*i. e.* of iritis the late result of acquired syphilis), I next quote the case of Hannah H—, widow, æt. 63, who is under

the care of my colleague, Mr. Symonds, for disease of the nasal bones due to syphilis, presumably of considerable though unascertained duration. The bridge is much thickened, the skin over it of a dusky reddish brown, the inferior turbinated bone atrophied, and the superior hypertrophied. Ozæna is present. There is recent inflammation of the iris with keratitis punctata resulting in numerous posterior synechiæ, and much pigment on the adjacent lens capsule. It is matter of strong inference that the eye changes are due to syphilitic infection of considerable standing. The condition of the nose, the non-existence of any indications of secondary syphilis, and the age of the patient are strongly against any supposition of a recently acquired syphilis.

The third case is one of interest :—Emma D—, æt. 50, was married to her present husband twenty years before conceiving. The child died at seven and a half months. The second was still-born at full time. The two subsequently born survived, the mother being forty-four years old at the time of the last birth.

As she had an obstinate cutaneous rash, for which she was under treatment both at home, and subsequently at the Stamford Street Skin Hospital two years before the firstborn appeared, I ventured to think it likely that she was infected from outside the family by syphilis some two years before his birth. Some colour is lent to this by the fact that her husband energetically repudiated all her offspring. Her iritis was of the serous nature with typical keratitis punctata, and did well under mercury. Such history as can be obtained of the infants' and of her own skin rash is obscure.

I briefly mention also cases of two men in which an iritis appeared to be a late result of acquired syphilis.

John K—, æt. 33, had a primary sore seven and a half years ago, followed by no secondaries that he can recall. He has now a double iritis associated with keratitis punctata and increased tension. The case is controlled by mercurials.

J. L—, æt. 34, had a sore thirteen years ago, followed in about a year by some defect of sight in each eye, due, without doubt, to the choroiditis disseminata now recognisable ophthalmoscopically in each. Twelve years later his left eye presented iritis, with a thickening very like a condyloma or gumma iridis. The right became affected a month later, though without the gummatous thickening, while he was under a mercurial course. Both eyes did well, though with a slight relapse of each a year later.

These five patients have been, the three women presumably and the three men certainly, the subjects of primary syphilis, on the average, about twelve years previous to the iritis.

Turning to the other form, iritis occurring as a late result of congenital specific disease, I will, as pendants to the case of Richard R— previously cited, give the following:

Lionel S—, æt. 18, a tall, well-developed young fellow, a gardener, who has double-sided iritis with keratitis punctata and increased tension. He is the fourth child, but, in addition, four miscarriages at three months immediately preceded him, and he was followed by a child who shows markedly syphilitic central upper incisors. He himself has no syphilitic appearances.

Gertrude L—, æt. 17, an anæmic-looking girl, with marked iritis and keratitis punctata, both pupils being soon closed by a dense layer of lymph, which is in places very loosely attached to the pupillary edge. For a year I had no suspicion of syphilis in this case till the father came with a recent paralysis of the left external rectus muscle, which proved curable by iodide of potassium. The girl's teeth and physiognomy were not suggestive of congenital syphilis.

Susan W—, æt. 40, who, when aged twenty, was under the care of the late Mr. Streatfeild for double iritis with keratitis punctata, when also choroiditis disseminata was noted, and a typical notching of her teeth. Now she is the subject of a glaucoma which has blinded

the left eye, and threatens very seriously the right. There is a minute trace of deep-seated haze at the lower part of each cornea.

Miss K—, æt. 29, who was under my care with iritis of each eye in turn, resulting in exclusion of pupil with secondary glaucoma, for which iridectomy was done on each side with fair result as to tension and vision. The real nature of this case first suggested itself to me one and a half years later, when I was visited by a brother, her senior by two and a half years. He comes on account of defective vision, due partly to old choroiditis disseminata, partly to interstitial haze of each cornea, most marked on the right side, and partly to iritis of the left side, which last appears to be the most recent of the three morbid changes. His teeth and physiognomy, like his sister's, are good.

James N—, æt. 11, who is the third child, and comes after an interval of eight years. He has had irido-cyclitis, indicated by dots on the posterior elastic lamina, occlusion of pupil, and varying tension. Iridectomies have got him some increase of vision, and demonstrate the presence of choroiditis disseminata. His eyes came bad when aged nine. His teeth are characteristic of congenital specific disease.

The following case presents a form of irido-cyclitis tending in its appearances and associations towards interstitial keratitis, though the iritis is here relatively far more predominant than that which seems to accompany and perhaps be secondary to, every severe interstitial keratitis of syphilis.

Philip H—, æt. 14, eldest living child. His iritis commenced at the age of twelve and three quarters. His iris is altered in texture, and his pupil blocked by lymph. He has had irregular dots on the posterior corneal surface, and some small rounded interstitial opacities of the corneal substance, all of which have gradually developed into a roughly triangular bluish-white opaque plaque, which appears to be deep in the

cornea or on its posterior surface. He has for many months been the subject of great variations of the ocular tension, which has now, however, fallen to normal. He has markedly notched teeth and a characteristically syphilitic physiognomy.

I have at this moment in Guy's Hospital a man, Victor J—, æt. 28, the eldest born of the family, who has on the right side an interstitial keratitis of a spotty character, and on his left an uncomplicated iritis with a haze of lymph in the pupillary area. And it has fallen to my lot to observe two cases of one-sided well-marked condyloma iridis in boys of eighteen who have been perfectly free from any other personal manifestation of syphilis, acquired or inherited.

Conclusions.—That there is sufficient evidence that a late iritis sometimes follows an acquired syphilis, and that the average time of its outbreak after the primary sore is something like thirteen years. That such iritis is generally double, and its usual form an iritis serosa, —that is to say, an iritis, or rather an irido-cyclitis, with comparatively little tendency to the formation of posterior synechiæ, and accompanied with dotted deposits on the lower part of the posterior surface of the cornea, and with a tendency to secondary glaucoma. That the patient may show other late manifestations of specific disease, *e. g.* ozæna and remains of disseminated choroiditis.

That a similar late iritis may follow an inherited syphilis, and that the average age of the patient, though varying within wide limits, approximates to twenty-one. That the usual type is, as in the late iritis of the acquired disease, a double serous iritis of no great intensity. Sometimes, however, the iritis is a severer form of the same type with rapidly varying tension, and with the blockage of the pupillary area by a uniform layer of grey lymph, such lymph being comparatively free from the pupillary edge.

That such an iritis may also be accompanied with

larger and more cloudy dots on the posterior surface of, or deep in, the cornea, such deposits usually leading ultimately to the formation of a dense bluish-white triangular plaque deep in, or behind, the lower part of the cornea. That the iritis may more rarely present a different type, the gummatous, possibly with *peripheral* anterior synechiæ, or the more purely adhesive, leading even to exclusion of the pupil and secondary glaucoma. That this late iritis of acquired syphilis may show a close relation to interstitial keratitis, *e. g.* a pure iritis serosa may gradually become associated with a typical vascularising interstitial keratitis. Or a slight interstitial keratitis may be followed after an interval of months by a gummatous iritis; while the iritis with blocked pupil and deep triangular corneal plaque often is accompanied by fine filmy or more extensive and denser opacities in the rest of the cornea. That teeth presenting the usual characters of inherited syphilis are rare, or perhaps even uniformly absent in the pure iritis serosa of late inherited syphilis; whereas they are present in increasing frequency as the disease approximates in its associated characters to interstitial keratitis. That in the pure iritis of late inherited syphilis the general physical development of the patient is usually conspicuously good.

(*March* 14*th*, 1895.)

Mr. Higgens said the case shown by Dr. Brailey looked to him like an ordinary case of interstitial keratitis. It looked like a very old case, and he suggested that it might have escaped the author's observation that the patient had had an attack of keratitis possibly during an interval in his attendance at hospital.

Mr. Lang said he had noticed that in this class o case the iris was adherent to the back of the cornea, forming a peripheral anterior synechia, unlike the anterior synechia formed in cases of closed pupil with consequent *iris bombé;* and two of Dr. Brailey's cases pre-

sented this condition. He thought it was peculiar to this form of iritis—which was certainly unassociated with ordinary interstitial keratitis.

Dr. Hern asked whether the iritis was a primary iritis extending to and becoming a keratitis, because if so they were cases which were quite familiar to all of them.

Mr. Spencer Watson said it would be very instructive if the author would point out in what consisted the special novelty of his communication. He himself had seen a great number of cases of interstitial keratitis with iritis, and also with dotted deposits on the posterior surface of the cornea. There seemed to be nothing unusual about that. He had taken a good deal of pains to tabulate a number of cases of interstitial keratitis of inherited syphilis, and he had found that iritis was often associated with it, a matter with which they were probably all perfectly familiar.

Mr. Jessop said he was very interested in one of these cases, in which on the anterior part of the iris there were apparently many dots. It was a sort of punctate deposit on the iris itself. He thought everybody would agree that there were a good many of these cases which had long required the construction of a separate group. He had under his care now a similar case, except that the spots were much larger. These were certainly not cases of ordinary interstitial keratitis.

Dr. Brailey, in reply, said that the one most important point had been missed by one speaker. He intended to speak mainly of iritis quite independent of interstitial keratitis. With regard to Mr. Lang's question as to peripheral adhesions of the iris to the cornea, his own experience had been that in these cases, which were very severe, they were not uncommon. There was a peculiarity about these adhesions, viz. that they were extremely peripheral, and were often in buff-coloured pointed processes of the thickened iris, or even in curved peripheral ridges, and there was also considerable thickening of the iris, as if by gummatous deposit. With regard to what Mr.

Higgens had said about the triangular opacity on the lower part of the cornea, he should have mentioned that the boy had been under his own observation for many years, and he had seen it develop from the coalescence of dots mainly on the posterior surface, but also perhaps deep in the cornea. The patient was first at the hospital, and for many years had been at the Blind School, of which he was the medical officer.

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2. *Tubercle of iris and ? cornea.*

By Donald Gunn.

William P—, æt. 6½.

Family history.—Maternal uncle and aunt died of consumption. Is the younger of two children; the elder, a girl, said to be delicate. No deaths.

Past history.—Never strong; last year was ill for many weeks with broncho-pneumonia. Nothing in history indicative of hereditary syphilis.

Four weeks ago right eye was noticed to be red, but for some weeks previously he had screwed up his eye when facing a light. Made no complaint of pain, but when questioned said that it ached a little.

Present state (November 13th, 1894).—L. eye $\frac{6}{6}$, Hm. 1 D. Iris grey. Pupil active. R. eye slightly flushed. Iris injected, thickened, and discoloured. Pupil sluggish, dilates evenly to atropine. T. n. V. = $\frac{5}{60}$, not improved.

Lower half of cornea studded with flat, sharp-edged, circular white spots, varying from 2 mm. down to specks that can only be seen with a high-power lens. They are situated on or near the posterior surface. There are no pigmented spots. The aqueous is clear.

On the iris are three nodules, semi-translucent in look,

and of a pinkish-grey colour; there are some small vessels on one (the innermost).

On front of the lens is a ring of pigment dots.

Ophthalmoscope. — ? Vitreous haze; only coarsest details of fundus can be seen. Veins are probably full.

Chest.—No evidence of tubercular mischief.

(*Card specimen. December 13th*, 1894.)

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3. *Tuberculosis of the iris and ciliary body.*

By A. Quarry Silcock.

R. F—, æt. 14 years, was admitted into Moorfields Hospital on January 22nd, 1894, on account of severe irido-cyclitis of the right eye.

Five weeks before admission the eye became blood-shot, and has continued to get worse. Previous to this the sight was quite good.

The grandmother on the mother's side died of consumption. Her mother's sister also has consumption.

State on admission.—Patient is a delicate-looking girl, who has recently recovered from an attack of rheumatic fever. The eye is injected, and there are numerous deposits in the deeper layers of the cornea at its lower part, having some resemblance to the condition known as keratitis punctata, but the patches are much larger. Situated on the iris towards the nasal side is a large vascular mass, which projects forwards and touches the periphery of the cornea. The pupil is distorted by this mass.

Feeble fundus reflex. V. = fingers at 18″.

There are well-marked signs of phthisis at the apex of the right lung;—moist râles, &c.

The heart's action is very irregular, there is a pre-systolic mitral murmur.

Patient was discharged and sent to a convalescent home.

Present state (June, 1895).—The signs in the lungs have quite cleared up. Patient has put on flesh, and her general condition is excellent.

The mass on the iris is much smaller, and the pupil is clearer; the details of the fundus cannot quite be made out, although she is using atropine.

R. V. $= \frac{4}{60}$ c̄ sph. + 4 D. J. 14.

(*Card specimen. June 13th*, 1895.)

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4. *New pigment spots on anterior surface of iris.*

By Walter H. Jessop.

Sarah S—, æt. 34, attended at St. Bartholomew's Hospital in December, 1894. Two years ago she was under treatment for interstitial keratitis in both eyes.

Left eye: cornea, large central nebula. Anterior chamber deep. Iris atrophied-looking, several old posterior synechiæ. On anterior surface are several small black dots arranged in two circles; the peripheral dots are blacker than the more central ones.

Vision: counts fingers at 12 inches.

Right eye: corneal nebula larger than left. Iris: several black and rusty-coloured dots on outer side, but not so numerous as in left.

(*Card specimen. January 31st*, 1895.)

V. DISEASES AND INJURIES OF THE LENS.

1. *Lamellar cataract and rickets.*

By E. Treacher Collins.

Davidson and Horner,* of Zurich, in 1865 first originated the idea that lamellar cataract was the result of rickets. Their views have been widely accepted on the Continent, but not so in this country; none of the text-books by the following authors make any mention of rickets in speaking of this form of cataract: Berry, Carter and Frost, Juler, Macnamara, Lawson, Nettleship, Power, Swanzy, Soelberg Wells.

The supposed ætiological relation of rickets to lamellar cataract is well summed up in the following passage from the American translation of Fuchs' 'Text-book on Diseases of the eye:'—"Lamellar cataract almost always affects both eyes. Its time of origin falls within the first years of life. It is found, above all, in those children who have suffered from convulsions (Arlt). Such convulsions are mostly caused by rickets, and especially by the rachitic changes in the skull (craniotabes). The teeth at the same time are irregularly formed, often being represented simply by cubical or irregular stumps, which are covered unevenly by enamel, or in places are entirely denuded (rachitic teeth). Lamellar cataract, therefore, stands in ætiological connection with rickets (Horner). Inheritance of lamellar cataract is a not infrequent occurrence."

Contenting myself with the above quotation, I will not further enter into all the arguments which have up to now been brought forward, for and against, the ætio-

* "Zur Lehre vom Schichtstaar," 'Inaug.-Dissert.,' Zurich, 1865.

logical relation between rickets and lamellar cataract, but will at once proceed to the new evidence I have to bring before you this evening.

It occurred to me that much might be learnt by an inquiry into the relative frequency of lamellar cataract and rickets in our Australian colonies, because I was told that rickets was much less frequent and much less severe there than in the mother country. With this object in view I wrote to several friends in Australia on the subject, and I wish to express my great indebtedness to Drs. Barrett and Symons for collecting for me the valuable information I have now to lay before you, and also to the other gentlemen I shall mention in the course of the paper.

Dr. Barrett sends me the following from Melbourne:

Report on the character and distribution of rickets in Victoria (by W. Snowball, M.B., Hon. Med. Officer to the Children's Hospital, Melbourne).—Ten years ago rickets, even in its slightest manifestations, was extremely rare amongst the out-patients at the Melbourne Children's Hospital. At the same time the proportion of those affected by constitutional disorders, notably congenital syphilis and tubercular troubles, was very great.

During the last two years there has been an extraordinary increase in the number of rachitic troubles of every kind. Even the more serious and grave condition of scurvy rickets, in place of being a clinical curiosity, is now comparatively common.

So sudden an increase in these cases must be due to an equally sudden alteration in the surroundings of the population, and this alteration may be demonstrated by a brief review of the social change which of late years has taken place in the suburbs and city proper of Melbourne. Five years ago, during a period of great commercial prosperity, there was an extraordinary influx of population into Melbourne. Houses were run up in all directions, hygienic measures were totally neglected, as has been shown by the outbreak of zymotic diseases

in different parts. The inevitable collapse came, perhaps more suddenly than usual, and families were thrown out of work; houses are now deserted, people are herded together, three or four families occupy one house in order to save rent. In many cases the mother of a suckling child has had to become a worker, and the child has been unseasonably bottle-fed.

The difficulty of obtaining and keeping fresh milk in our climate has naturally turned the attention of mothers to the various artificial food preparations, the cheaper ones of course obtaining now the preference. No doubt these conditions of artificial feeding existed to some extent before, but in prosperous times bottle-fed children of even the poorer parents received important additions to their diet in the shape of butter and little fresh food delicacies, which were then plentiful in almost all households, but are now lacking.

The drainage of Melbourne, an open system and very defective, has gradually been proving a source of danger, and during the stress of an acute influx of population was found to be totally inadequate, so that, to (1) dietetic mismanagement, (2) defective hygiene has added its factor in the present increase of rickets in Melbourne. Regarding the form of rickets met with here, as compared with what I have seen in England, it may be said that we rarely get the deformed limbs and distortions so common there.

The following would be roughly an outline of an ordinary case met with here:—A bottle-fed baby, probably on condensed milk and thin maizena, ten or twelve months old, no teeth, wasted limbs, dyspeptic troubles, distinctly beaded ribs, sweating head, enlargement and tenderness of the epiphyses of the long bones, is brought up for treatment because the mother has been wearied out with its constant fretfulness and evident pain when handled. One manifestation of rickets so common in England, viz. laryngismus stridulus, is almost unknown here.

Statement concerning the prevalence of rickets in Victoria (by JEFFREY WOOD, M.D., Hon. Medical Officer of the Children's Hospital, Melbourne).—In reference to your question concerning the existence of rickets in Victoria, the following sums up my experience of six years in the out-patient department of the Melbourne Hospital for Sick Children.

Rachitis exists in Victoria to a large extent. It differs from the same disease in England and Scotland in that the bony deformities in the shape of bowed legs and arms are not seen to any extent. Thus, in an attendance of 1000 out-patients, we would only see four or five cases of bowed legs; whilst rachitis in its milder forms, such as sweating head, beaded ribs, and slightly enlarged epiphyses, is a common complaint, and probably 100 such cases would be treated in the 1000 attendances. This disease is seen in three varieties.

1st. In the bottle-fed infants; and from my experience I am inclined to say that a deficiency of fat in the food is the chief factor in its causation.

2nd. In breast-fed infants who are kept on the breast for any length of time after the eleventh month.

3rd. In congenital syphilis, where the swollen tissues in the nose lead to difficulty in suckling.

The reason that bony deformities are not common in this colony is, I think, due to the fact that the lower classes have a much more liberal scale of diet than is met with amongst the labouring classes of the old country; and consequently when the child is old enough to help itself from the table, and so become emancipated from its mother's erroneous ideas of infant feeding, the symptoms of rickets rapidly pass away.

Artificial foods and condensed milk seem to be the two classes of food which more than anything else cause rickets in this colony. I have seen several cases of scurvy rickets during the last twelve months, due in most cases to the use of one of the artificial foods without fresh milk.

Respecting the frequency of lamellar cataract, Dr. A. L. Kenny has not met with one case during an experience of two and a quarter years at the Victoria Eye and Ear Hospital, and five years in practice.

Mr. J. T. Rndall, F.R.C.S.Eng., finds that in his experience lamellar cataract is an unusual affection; so, indeed, is any form of cataract (except traumatic) in infants or young subjects.

Dr. J. Jackson, who has had an experience extending over twenty years, has not seen a case of lamellar cataract in Victoria or South Australia, either in hospital or private practice.

Dr. J. W. Barrett has seen one case of lamellar cataract which had been operated on by the late Dr. Bowen; whether the patient was a native or a colonist he is unable to state.

From a perusal of the foregoing reports it will be seen that rickets until recently was a comparatively rare disease in Victoria; that it is more common now, but that the severity of the affection is much less than in the old world.

From the foregoing reports it will be noted that in Victoria lamellar cataract is an exceedingly rare disease. Whether it will become more plentiful with an increasing amount of rickets remains to be ascertained.

Dr. Symons writes to me from Adelaide: "There is no doubt as to the infrequency of rickets, and also of lamellar cataract here. It is very difficult to get statistics. I have looked into several of the reports of the Melbourne, Sydney, Brisbane, and Hobart hospitals, and find rickets very rare. The cataracts are all enumerated together, there being no division embracing lamellar cataract. In the Adelaide Hospital, with an average of over 2000 new cases annually, there have only been three cases of rickets and three of lamellar cataract between now and the year 1877. In private practice I have had lamellar cataract in a proportion of one in 2000 cases. I cannot tell you if these cases were imported into South Australia or not."

At Dr. Symons' request the house surgeon of the Adelaide Children's Hospital, Dr. H. A. Powell, looked over the notes of the cases treated at that institution during the last twelve years, but found no record of rickets.

Dr. T. K. Hamilton, of Adelaide, writes: "I have records of about 4500 eye cases taken during the past five and a half years in my practice here, and amongst them I can find only two cases of lamellar cataract recorded, in both of which the individual affected was born in England, so my Australian cases of this disease are *nil*. I have only seen one case of what I call rickets in this colony."

From Sydney Dr. Maher writes that his "impression is that lamellar cataract is of much rarer occurrence in New South Wales than in England." "Since I have been in practice in Sydney I have not seen more than ten cases; of these four occurred in one family, the mother and three of her four children had lamellar cataract. In another family the mother and her only child were both affected."

Dr. Pockley, of the same town, in a letter to Dr. Barrett says, "I am very sorry to say that the records of the cases that have been seen at the Prince Alfred Hospital are of no use, as sufficient particulars have not been noted, and in many summaries the lamellar cataracts are included with other varieties. In regard to rickets, however, this disease is not at all uncommon here. My friend and colleague Dr. Chible, who has had a long experience at the Prince Alfred and the Children's Hospitals, tells me that he believes rickets to be quite as common here in proportion to the population as it is in English towns."

I further asked Dr. Barrett to ascertain for me whether or not the imperfect development of the enamel of the teeth so frequently associated with lamellar cataract was as commonly met with in Australia as in this country. He kindly communicated with some of the leading dentists of Melbourne on the matter. Mr. C. F. Fyffe says, "Such cases are fortunately rare in Victoria, and I have seen very few." Mr. E. C. Carter writes, "Regarding

the frequency with which this class of teeth are met with in Melbourne, I may say that I have gone carefully through my books, and, as far as I can judge, I should say that the number is about three per thousand. Regarding the birthplace of the subjects, I may say that in every case, so far as I have made inquiries, the subject has been born in a foreign country, and they generally say that they were delicate as children, but never in all my practice do I remember to have come across a case of honeycomb teeth in a colonial-born subject." Another gentleman states that "he has frequently met with such teeth," but as he goes on to add "especially in the bicuspid region of the lower maxilla," and as Mr. Hutchinson, who was one of the first to describe them, says that "with but very few exceptions indeed the bicuspids escape entirely," I think he must be referring to some other condition.

During a recent visit I paid to Persia I particularly directed my attention to the frequency of these two diseases, rickets and lamellar cataract. I inquired of the medical men I met, who had had a European education, as to rickets, and the following assured me that it was very infrequent: Dr. Scully of Shiraz, Dr. Hussein Khan of Ispahan, Dr. Aganoor of Julfa, and Dr. Odling of Teheran. Certainly the conditions of life there are not such as are usually considered likely to favour its development. The climate is an exceedingly dry one, for a great part of the year there is uninterrupted sunshine, and life is to a great extent in the open air. The rooms of the rich are lofty, and those of the poor are always well ventilated, for when they have doors in the doorways they are sure not to fit. No such things are used as complicated artificial foods for infants, the mothers suckle their children, often, I must state, unduly long,—for the same belief exists in that country as in this, that while suckling the possibility of again becoming pregnant is avoided. During the four months I was in Persia I saw an immense number of patients suffering with diseases of the eye, but I only met with one case of lamellar cataract; in it the layer of

opacity was very thin,—not, indeed, sufficiently dense to necessitate an operation.

To sum up, then, the evidence I have collected goes to show that in Adelaide rickets is a rare disease, and lamellar cataract very infrequent. In Melbourne rickets was until recently comparatively rare, that it is more common now, but that the severity of the affection is much less than in the old world; lamellar cataract is exceedingly rare, and the honeycombed condition of the enamel of the teeth is not often met with.

In Sydney, the oldest city in Australia, rickets is said to be as common as in England, but I have no statement as to its comparative severity: lamellar cataract is less frequent than in this country. In Persia rickets and lamellar cataract are both very rare.

(*November 8th*, 1894.)

Dr. Stephen Mackenzie observed that though members might not be able at the moment to bring forward strong facts to support the author's thesis, his paper would open up again a field of inquiry in respect of the common causation of the three conditions raised, viz. the association of lamellar cataract with rickets and deformed teeth. It was a very interesting paper, if only as showing the effects of social development, and the illustrations of the sanitary condition of Australian towns. It was certainly striking, with the greater aggregation of people, insufficient food, and overcrowding, how the diseases of the mother country were becoming established in the colonies. The question had not been solved, in the statistics brought forward by Mr. Collins, as to the existence of any strong association between lamellar cataract and rickets. There had been some statements which would be of value as to the numerical frequency of these complaints, but even in this respect he had not gathered that the association was at all pronounced, most of the reports being to the effect that both were rare. In the cases in which lamellar cataract had been found it was not shown, however, to be in asso-

ciation with rickets. This could easily be understood. He pointed out that it would not be easy to find complete records of the facts required in hospital notes made without reference to this point. With regard to the association of rickets with the deformity of the teeth, he said he had a general impression that the two were associated, but he had no theory on the subject of their causation, and it was not a subject at which he had collected any statistical evidence, or on which he felt himself entitled to express any decided opinion. He felt certain, however, that children suffering from rickets often presented defects of the enamel, but that was because the change was one looked for in such cases. But he could not say he had looked for this change in the teeth of children with other diseases with sufficient purpose to allow of any conclusion on this point. There were many interesting points in connection with inheritance and embryology. He held, with Mr. Lawford, that although the enamel germ might be quite normal at birth, it might nevertheless go wrong as a consequence of an inherited tendency to disease,—just as, for instance, in syphilis, in which a child might be healthy when born, and yet develop the disease after a time, though perhaps that might not be altogether a fair analogy. They knew that many hereditary diseases made their appearance in the offspring, although nothing was obviously the matter at birth, and whether such diseases were congenital or not was, he admitted, a matter for argument.

Mr. Lang pointed out that lamellar cataract involved the whole nucleus of the lens, and observed that as this part of the lens and the affected portion of the enamel were both formed before birth, the changes ought to be due to some cause occurring before birth.

Mr. Sydney Stephenson mentioned that he had examined, as a matter of routine, the eyes of all children entering a school with which he was connected, and he had, in all, examined in this way the eyes of some 5000 children, in only four of whom had he found lamellar

cataract. He pointed out that in some of these cases the opacity was so fine that it would have escaped observation had it not been specially looked for. He added that rickets was common among admissions to the schools, and in the older children, *i. e.* between five and six years of age, the effects of past rickets were commonly enough observed.

Mr. Lawford said that with respect to the enamel organ of the teeth, though this was laid down before birth, and might at that time be normal, it did not necessarily follow that it would grow normally. The influence of rickets or other constitutional disturbance might subsequently cause it to deviate from its natural growth.

Mr. Marshall observed that he had been in the habit of looking upon defects of the nature of lamellar cataract as occurring in association with fits, or with some mal-development of the nervous system, so that it was quite possible that the defective teeth and the lamellar cataract and the fits arose from the same cause. He pointed out that the central nervous system, the lens, and the enamel of the teeth, all three arose from the same portion of the blastoderm, viz. the epiblast, and that the affection of the teeth must be antecedent to birth, and probably the affection of the lens as well. In these cases the fits usually occurred early in life, consequently all the three conditions might be dependent upon the same mal-development of the epiblast.

Mr. Marcus Gunn said that when he last had occasion to look up the literature of this subject it seemed to be a moot point whether this form of cataract was acquired or congenital. There was certainly much evidence in favour of its being congenital, and under these circumstances it was impossible to regard its occurrence as dependent on any defective nourishment of the infant after birth, as the author seemed to suggest. When he was in Australia he happened to examine the eyes of a young koala (native bear) captured while still in the mother's pouch, and he found it had well-marked lamellar cataract. The mother was well nourished.

Mr. Silcock asked if that peculiar abnormality of the teeth known to be associated with lamellar cataract was more commonly met with in those who, in infancy, had been the subject of rickets than in others who had not. In his opinion the very interesting observations of Mr. Treacher Collins tended to show, not that lamellar cataract was induced by rickets, but that both these conditions were the result of similar underlying causes.

Mr. Collins, in reply, said that though most of the speakers had dissented from the view that there was any association between lamellar cataract and rickets, none of them had dealt with the important fact he had brought forward that both conditions were rare in Australia. The question had been raised as to whether lamellar cataract was congenital or not, and he referred to an interesting paper by Bernard Dubb, who had proved that the zone of opacity in lamellar cataracts was always smaller than the lens at birth, so that he had arrived at the conclusion that either the lamellar cataract was formed before birth, or that the zone of opacity was not the most peripheral at the time it became opaque. Mr. Collins thought that this latter assumption was not necessary, but that it was quite likely, as the result of some general disturbance of nutrition, such as rickets, for the part of the lens furthest from the nutrient supply to shrink, and as the result of the shrinking for an opaque zone to be formed between the nucleus and the cortex from which it had contracted. Microscopical examination of lamellar cataracts had shown that the morbid changes in them were not confined to the opaque zone, but that the nucleus was also involved. It was well known how evanescent the manifestations of rickets sometimes were, and it would be quite likely for them to become obliterated before the lamellar cataract was noticed. He reminded the Society that the enamel of those teeth most often affected, namely, the first molars, incisors, and canines, was being calcified just at the time when rickets usually commenced, *i. e.* during the first two years of life. The occurrence of lamellar

cataract in the lower animals was no argument against its being due to rickets, for that disease had also been met with in them.

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2. *A case of traumatic cataract with a foreign body embedded in the lens successfully treated by operation.*

By W. Spencer Watson and W. J. Collins.

The following notes were to a great extent put together by Mr. Cargill, the house surgeon of the Royal Eye Hospital.

David M—, a plumber æt. 29, was, when admitted on the 22nd of January, 1894, in the following condition :— The right eye was cataractous from some injury which could not be distinctly identified. The patient accidentally discovered that the eye was defective as to sight in November, 1893, since which date the sight had become dimmer, and we found on testing his vision that he had only perception of light with this eye. He has had several injuries to the eye at various times. Among others he mentions the fact that some plumber's solder once spurted up into his face, and this may have happened on two occasions. The right lens was completely opaque, and lying on the front of the lens, or possibly on the anterior capsule near the lower and inner quadrant, was a minute yellowish-white foreign body. In the cornea, at a point 3 mm. below this foreign body, was a scar as if from the result of a penetrating wound. It seemed obvious that the foreign body had found its way in through this wound in the cornea. The anterior chamber was shallow, the pupil circular and reacting well, field and light perception good. The L. V. $\frac{6}{9}$, not improved by glasses, and reads J. 1.

January 26th.—Under cocaine and with the pupil under

the influence of atropine, Dr. Collins (during Mr. Watson's temporary absence) performed discission smoothly and moderately. After the operation the pupil was kept dilated by the use of atropine. All went well, the lens tissue softening gradually, and the foreign body remaining undisturbed.

On February 16th (three weeks after the discission) Mr. Watson performed linear extraction, and at the same time removed the foreign body, which came out with the mixed aqueous and softened lens substance when the curette was introduced. While endeavouring to remove some flocculi which remained, a portion of the vitreous protruded, and was cut off with the scissors at the wound in the cornea. The wound healed, leaving a clear pupil, and when seen on January 28th of the present year the pupil remained black and round, and with + 18 D. the patient read J. 4 with this eye. With + 15 D. his distant vision was $\frac{6}{24}$.

It is to be observed that in the treatment of this case especial care was taken to time the second operation so that the foreign body might be removed without risk. Three weeks were allowed to elapse from the time of the discission before attempting extraction. This interval sufficed to allow of due softening of the lens without permitting it to be quite liquefied. The foreign body was therefore retained almost in its original position till the time of its removal. Had liquefaction been allowed to proceed further it might have fallen into the anterior chamber or lodged on the back of the iris, and so set up a dangerous inflammation. It is difficult to lay down any rules as to the time that should elapse between the first and second operations in such cases. Much will depend upon the nature of the wound and of the foreign body, and much also upon the age of the patient. We must be guided chiefly by the appearances presented by the lens after discission, and time our second operation in accordance with the indications thus obtained.

(*March 14th*, 1895.)

Mr. Drake-Brockman related the case of a soldier whose eye was injured by a splinter from a bullet received while marking at the butts. Several days elapsed before he was sent to the hospital. He then presented a wound of the cornea, an opaque lens, and in the anterior chamber there was a small portion of metal splinter pinning down the iris to the lens. As the lens was quite opaque, and there was a considerable amount of irritation about the eye, he operated at once, removing that portion of the iris which had been injured, and bringing away the lens, together with the foreign body. He did not attempt anything like cutting up the lens, as there was no time to be lost. The patient did well, and as the affected eye was the left he was able to return to duty.

Mr. Devereux Marshall referred to a case in which the foreign body was removed very shortly after the infliction of the injury, the lens, which was clear, being removed at the same time. The case did well.

Mr. Spencer Watson, in reply, observed that the cases referred to being recently inflicted injuries were not on quite the same footing as his own case. Removal of the lens within a few weeks would be quite a different matter. He thought there was some danger in dealing with a wounded lens that was still quite clear, and, personally, he would hardly feel disposed to follow such an example even in a young subject, because there was always the danger that the softened lens matter during its softening might swell up through the rent in the capsule and adhere to the iris.

---

3. *Cholesterine crystals in the lens.*

By W. Lang.

J. H—, æt. 60. Admitted November 17th, 1894.

History.—Sight of both eyes failing for about ten

years, and gradually getting worse. No history of ill-health or injury. Has worn glasses for near work.

Lids healthy. Corneæ clear. Pupils active. *Lens:* immature cataract in both, with soft clear cortex. Numerous glistening bodies of the size and shape of crystals of cholesterine scattered throughout the lens substance. Fundus apparently normal.

R. V.: $\frac{6}{36}$ { Sph. + 2·0 = $\frac{6}{24}$. Sph. + 6·9 = J. 14.

L. V.: $\frac{6}{60}$ { Sph. + 2·0 = $\frac{6}{24}$. Sph. + 6·0 = J. 14.

(*Card specimen. November 8th,* 1894.)

Mr. Marcus Gunn admitted that the appearances were not common, but he remembered having seen them on several occasions. The crystals were of a peculiar iridescent character, and seemed to differ from cholesterine crystals. On examining them with a strong second lens they were observed to be apparently arranged in sheaves of acicular crystals,—in fact, like crystals of typical tyrosine. As tyrosine had been described as occurring in the lens in diseased conditions, he suggested that possibly this would be found to be their nature in the author's case.

Mr. Lang replied that he proposed to remove the lens shortly, and it would then be possible to ascertain their nature definitely.

---

4. *Cholesterine crystals found in a cataractous lens.*

By W. Lang.

The patient in whose lens these crystals were found was shown at the last meeting of the Ophthalmological Society. Since then the cataract has been removed, and typical cholesterine crystals were found in it. The patient is expected to be present this evening, and similar crystals can be seen in the lens of the other eye.

The iridescent appearance of the crystals is uncommon with cholesterine.

(*Card specimen. December 13th,* 1894.)

---

5. *Peculiar coralliform cataract with crystals (? of cholesterine) in the lens.*

By R. Marcus Gunn.

(With Plate IV, fig. 3.)

J. B—, æt. 22, admitted to Moorfields Eye Hospital on February 26th, 1895. He says that his sight has always been bad.

Corneæ clear; pupils active; accommodation good. In both eyes there is a peculiar form of cataract, that in the right eye being rather the denser.

On focal illumination, rounded and oblong grey and white opacities are seen grouped towards the centre of each lens, so as to resemble a piece of coral growing forwards and spreading outwards from this point. The oblong opacities represent somewhat conical *tubes,* and their anterior extremities consequently appear as opaque circles or ovals. There are numerous, very fine iridescent crystals throughout the clearer part of the lens.

R. and L. eye, V. = $\frac{6}{36}$, not improved; J. 1 at 5 inches.

(*Card specimen. March 14th,* 1895.)

---

6. *Peculiar variety of lamellar cataract.*

By R. Marcus Gunn.

(With Plate IV, fig. 2.)

Alex. M—, æt. 7. No history of fits. Teeth deficient in enamel. R. eye, V. = $\frac{3}{60}$; L. eye, V. = $\frac{4}{60}$.

In each lens there is a condition such as is shown in the drawing. We recognise a lamellar opacity of small size, but bordered by a very decided band. The *centre* of the lens is fairly clear, except for a series of distinct sharp round dots, varying considerably in size. Outside and concentric with the lamellar opacity are three opaque areas ; these are all evidently in the same lenticular zone, and occur at the parts of this zone which correspond to the anterior junctions of the segments of the young lens. In the line of the segment-junctions, in the lower part of the lens, are seen radial opacities, broad at the periphery, and gradually narrowing to a fine point near the lamellar opacity. The concentric opaque patches are interrupted where the radial opacities pass through them.

(*Card specimen. October 18th*, 1894.)

---

7. *Case of lamellar cataract showing symmetrical markings in a boy aged nine.*

By George Lindsay Johnson.

(With Plate V.)

The margin of the lens is clear, but imperfectly defined. About 3 mm. internal to the margin a strongly marked circular ring is seen showing the edge of the nucleus, and which corresponds in healthy eyes to the circular lymph canal between the nucleus and the cortex of the lens. On the convex anterior surface of the nucleus three clear oval patches are seen at regular intervals round the nucleus. They point towards the centre. At the centre three ill-defined opaque patches meet, which radiate out a little way between the oval patches.

Three opaque striæ radiate along the posterior capsule to the circumference of the lens. They lie just behind

PLATE V

Illustrates Mr. Lindsay Johnson's case of Lamellar Cataract with Symmetrical Markings (p. 120).

A. W. Head, del.

and parallel to the three pointed oval patches above mentioned.

The L. eye showed precisely the same condition, but the preliminary needling I have made has obscured the markings.

There is no history of lamellar cataract in the parents or grandparents. The boy had repeated convulsions during teething at the age of nine months.

(*Card specimen. December 13th*, 1894.)

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8. *Traumatic subluxation of lens of old standing; secondary zonular cataract and coloboma lentis.*

By R. Marcus Gunn.

(With Plate IV, fig. 4.)

A man, æt. 44, came to Moorfields recently to ask if anything could be done to improve the sight of his right eye. He says that over twenty years ago he had a severe blow on this eye, which impaired its vision, and it has been defective ever since. It now can barely count fingers.

There is an old rupture of iris down and out, and the lens is displaced upwards and inwards. There is a central lenticular opacity, surrounded by a broad margin of clear lens substance as far as it can be followed, but the upper and inner circumference is necessarily hidden by the iris. The suspensory ligament is absent down and out, and is thickened at the extremities of the gap. Corresponding to this gap, there is a long, shallow notching of the lens-margin (see drawing). The other eye is normal in every way, with perfect visual acuity.

Remarks.—From the history of this case, and the present condition, the clinical facts admit most readily of the following interpretation :—

The original injury caused rupture of the iris and of the suspensory ligament, and displacement of the lens. From

an actual tearing of the capsule, or more probably simply as the result of impaired nutrition, the cortex of the lens soon became opaque. The clear margin now present is the result of lenticular growth since that date, and the pseudo-coloboma of the lens is due to the local absence of suspensory ligament.* The comparatively small size of the opaque portion of lens is due to the normal compression towards the nucleus that occurs as a result of new peripheral increase.

(*January* 31*st*, 1895.)

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9. *Right lenticonus posterior.*

By William Lang.

D. C—, æt. 38. At the posterior cortex of the *right lens*, and slightly down and out from its posterior pole, there is to be seen a well-defined disc with a bright contour. The posterior part of this area is studded with a number of fine dark dots. The fundus is normal. The V. = $\frac{6}{18}$ (and J. 12) ; + 1 D. = $\frac{6}{9}$.

(*Card specimen. October* 18*th*, 1894.)

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10. *Spontaneous symmetrical dislocation of both crystalline lenses.*

By R. Marcus Gunn.

John S—, æt. 76, labourer, came to Moorfields Eye Hospital on the 8th September, 1894. He wished

* I have elsewhere ('Ophth. Review,' vol. viii, p. 234) expressed the theoretical opinion that congenital local absence of suspensory ligament may be the cause of true coloboma of the lens. Mr. Treacher Collins has more recently adduced valuable anatomical evidence in support of this view ('R. L. O. H. Rep.,' vol. xiii, p. 87).

stronger glasses to assist him in reading. At that time the notes made were—" R. E. : V. = $\frac{6}{18}$, Hm. 2 D. = $\frac{6}{6}$. L. E. : V. = $\frac{6}{60}$, Hm. 3·5 D. = $\frac{6}{6}$; with + 6·5 D.; reads Jaeger 1 with fairly good range."

On the 17th of last month (April) he returned, saying that both his eyes have been failing since Christmas. He cannot account for this failure in any way. There is no history of cough, accident, or blow. His vision is now greatly reduced; cannot discern any letter at 6 metres. Counts fingers with each eye at a few feet.

On examination under homatropine, the lens in each eye was found to be displaced downwards, so far that its upper edge could just be seen above the lower edge of the dilated pupil. No disease could be detected in either fundus.

R. E. $\bar{c}$ + 13 D. = $\frac{6}{6}$. L. E. $\bar{c}$ + 13 D. = $\frac{6}{6}$ partly. With + 17 D. each eye reads Jaeger 1.

One of the dislocated lenses has become opaque; the other is still clear.

(*Card specimen. May 2nd*, 1895.)

VI. DISEASES OF THE RETINA AND CHOROID.

1. *Retinitis proliferans.*

By E. C. Fischer.

H. H—, æt. 23, admitted to Moorfields Hospital June 1st, 1895, under Mr. Nettleship's care.

History of failure of sight for the last six months in right eye, and in left eye for three weeks. Was able to read with left eye up to within a few days of admission.

R. V. = $\frac{6}{60}$. L. V. = fingers at 6 inches.

Two years and a half ago patient fell from a bicycle on to his head. Was stunned for a few minutes only; no bleeding from nose, ears, &c. Returned to work three days later. Remained well for eighteen months; then was confined to bed with "an abscess" in left hypochondriac region. No operation was performed, but patient went out of his mind, and was confined in Fareham Asylum for some months. Eyes became painful and inflamed at this time, but vision was not affected. There is no history of syphilis.

Patient has a dull, apathetic manner. All organs seem healthy. Urine, sp. gr. 1002. No sugar; no albumen.

Ophthalmoscope.—The most marked changes are in the right eye. There is extensive formation of new vessels throughout the vitreous. One large vessel runs in an arched manner forward and upward, giving off numerous fine anastomosing capillaries, somewhat resembling the mesenteric vessels. It eventually joins a second vessel running outward and upward, and forms with it a capillary network in upper part of vitreous. There is also extensive formation of connective tissue.

In the left eye the most obvious changes are large masses in the vitreous.

(*Card specimen. June 13th,* 1895.)

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2. *Detachment of retina with + tension.*

By Charles Wray.

The patient is a middle-aged man, and gives the following history.

The left eye was lost from an injury in childhood, presumably a penetrating wound of the globe. The eye afterwards became perfectly blind, but remained free from pain, though the patient says it watered a little on exposure to bright sunlight. The refraction of the right eye was hypermetropic in one meridian and myopic in the other as nearly as could be made out. The sight in it had been failing since 1885, at which time straight lines appeared crooked.

In 1893 he was taken into Moorfields as an in-patient, and the left eyeball removed in the interests of the right.

I first saw the patient in November, 1893, and found the external appearances of the eye quite normal. Tension + though not + 1. The ophthalmoscope showed an extensive detachment of the retina downwards and inwards, involving about a third of the fundus. Vision J. 20? Vitreous slightly hazy. No history of pain or redness of the eye.

The present condition of the eye is much as in November, 1893. Tension still elevated, but not + 1. Vitreous slightly hazy. The detachment involves the lower part of the fundus, and the disc can be seen with considerable difficulty. No pain or traces of inflammatory trouble.

Does the above condition indicate a growth in the eyeball, and what treatment should be carried out?

(*Card specimen. December 13th,* 1894.)

3. *Horizontal equatorial rupture of choroid.*

By E. Kenneth Campbell.

(With Plate IX, fig. 2.)

Thos. P—, æt. 22. Three years ago patient was struck with a piece of crust of bread of about the size of a cricket ball, which hit the front of the eye, it being thrown with considerable force. (Compare with pl. vii, vol. xii, p. 187.)

(*Card specimen. October* 18*th*, 1894.)

VII. DISEASES OF THE OPTIC NERVE.

1. *Nasal coloboma of the optic nerve; grey atrophy of the disc with peculiar fields: temporal hemianopia in the right eye, inferior hemianopia in the left eye; nervous symptoms of obscure origin.*

By George Ogilvie, M.B.Edin., M.R.C.P.Lond.

The case which I am going to present seems to me to be of exceptional interest, both from an ophthalmological and neurological point of view.

The following facts about the patient's family history were communicated to me by his wife.

His father and his mother both died insane. He is the father of seven children—four girls and three boys. The second child, a girl, died of paraplegia at the age of seven. The eldest child, a male aged thirty-one, had epileptic fits between thirteen and sixteen, and has had none since. The youngest child, a male aged seventeen, has had severe epileptic fits since the age of fifteen, and still continues to have them. The fourth child, a girl, had doubtful epileptic fits at puberty.

The other children are all healthy. Five of his children are married, and their children are all healthy.

The patient is fifty-seven years of age, and is a sorter and bundler of cigars, and has followed this occupation for upwards of forty-three years. He has hardly ever smoked more than nine cigars and one ounce of tobacco during the week. He had an epileptic fit about the age of twelve, and he used to have one or two during the year until he married at the age of twenty-five. During his thirty-two years of married life he has had either three

or four fits; the last fit occurred five years ago at the age of fifty-two. He has always enjoyed good health, and at the present moment seems well.

He noticed that his sight began to fail in December, 1893, and in April, 1894, he had to give up his work.

When I saw him in October, 1894, he complained of failing sight, occasional frontal headache, and towards the end of the day he felt his limbs aching and generally felt languid. On examining the eyes I found the following:—The movements of the anterior part of both globes are normal; the reaction of the pupils is sluggish but not absent. With the right eye the central vision is $\frac{6}{18}$ to $\frac{6}{12}$. With the left eye he counts fingers at about ten feet, while the axis of the eye is directed slightly downwards. With both eyes he makes searching movements of the head so often met with in cases of hemiopia.

By retinoscopy both eyes are found to present compound astigmatism, the refraction in the horizontal line beng + ·5 in either eye, and in the vertical from − 1·25 to − 1·5. On ophthalmoscopic examination thin floating opacities are seen in the vitreous of both eyes.

Both discs show very obvious discoloration, appearing partly grey, partly white.

In the right eye a small rim of white colour occupies the periphery of the disc towards its upper, lower, and inner border.

In the left eye a much broader stripe of white occupies corresponding parts of the fundus.

The difference in colour between these different parts is seen much better by the *indirect* than by the *direct* method of examination.

This contrast is particularly striking in the inverted image of the lower and outer part of the left disc, where the arch of a cilio-retinal vessel is seen curving over the disc.

There is some tortuosity of the veins in the left eye, and perhaps some narrowing of the blood-vessels in the right, but no traces of previous inflammation. There are

Fig. 11.

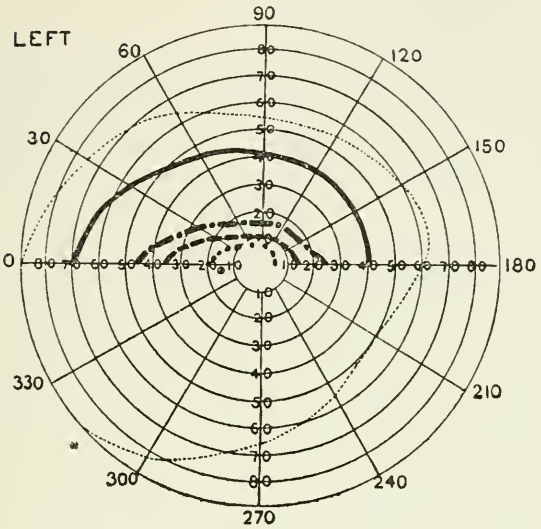
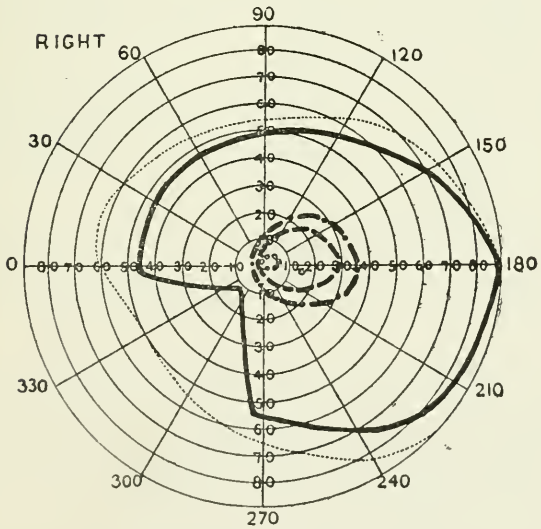


Fig. 12.



Fields of vision, October 15th, 1894.

——— Field for white. – – – – – – Field for red.
—·—·— „ „ blue. ..... „ „ green.

no changes in the periphery of the choroid. There is no physiological excavation.

The right field shows, besides a sector-like defect at the lower and inner part—characteristic of progressive optic atrophy—slight contraction for white, and very considerable contraction for colours (see p. 129). This contraction, however, concerns all colours proportionally, green being comparatively not more contracted than blue. In fact, in the inner, the inner upper, and the inner lower part the boundaries for the three colours coincide.

The left field presents the features of complete inferior hemianopia. The upper half of the field shows contraction for colours more than for white, but the contraction for colours is less pronounced than in the right field.

The patient's general health is good, and he has neither sugar nor albumen in the urine. There is no history of either syphilis or alcohol. An examination of the nasal cavities shows no signs of disease. The knee-jerks are exaggerated. Right foot, no clonus. Left foot, a few jerks. Right wrist, marked jerk. Left wrist, also marked jerk. There is no jaw jerk.

The picture of so-called inferior hemianopia in no way points to mischief in the neighbourhood of the chiasma, but, as it cannot be explained by the appearance of the disc, it must be due to some casual distribution of atrophic changes in the trunk of the optic nerve.

As to the character of the atrophy, it is not easy to decide by the present ophthalmoscopic appearances whether it is primary or consequent upon inflammation. The negative fact that there are at present no definite signs of former neuritis does not of course exclude an inflammatory origin. In favour of the latter a certain flatness of the disc, the want of excavation, and the invisibility of the lamina cribrosa must be adduced. From the paper given to the patient while under Mr. Morton's care at Moorfields in May, 1894, I see that at that time the right disc was in a neuritic condition, while the left had already passed into the atrophic stage. Accordingly

the inflammatory origin of the atrophy seems to be established.

While the cause of this inflammation remains obscure, the possibility of its being due to nicotine poisoning might be excluded, on account of the peculiarity of the colour fields, already pointed out, and also on account of the fact that there was no improvement in his condition after giving up his former occupation.

Although the general nervous symptoms are not sufficiently definite to allow of an exact localisation, the possibility of some cerebellar mischief must be borne in mind.

As to the ophthalmoscopic appearance of the discs, I have to confess that I at first attributed the contrast of colour to different discoloration of different parts of the disc, until it was pointed out to me by my friend Mr. Marcus Gunn that we probably have before us a combination of a congenital condition called Fuchs' coloboma and atrophy of the nerve. Although the position of this malformation in my case is uncommon, as it occupies the whole inner edge of the disc, while it is usually situated along the lower margin, and although there is no irregularity in the distribution or origin of the blood-vessels, and no displacement of a physiological excavation, other symptoms must be adduced in favour of this interpretation, viz. the existence of compound astigmatism, and the circumstance expressly mentioned by Fuchs that the contrast between the greyish and whitish parts is shown to much greater advantage in the indirect than in the direct image.

P.S.—Since these notes on the case were taken I have examined the fields of vision again, on the 7th of March. The left field shows practically no change (see p. 132). In the right eye the inner upper quadrant has nearly disappeared, thus giving the field the appearance seen in right lateral hemianopia. It is a curious coincidence that the right field should so closely mimic disease beyond the chiasma, whilst the left field mimics a condition occa-

Fig. 13.

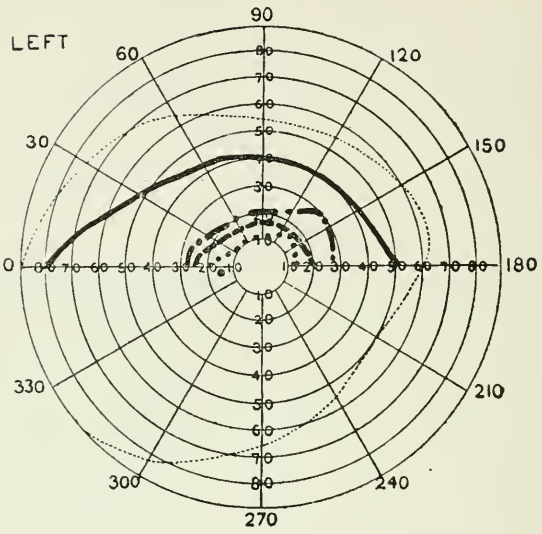
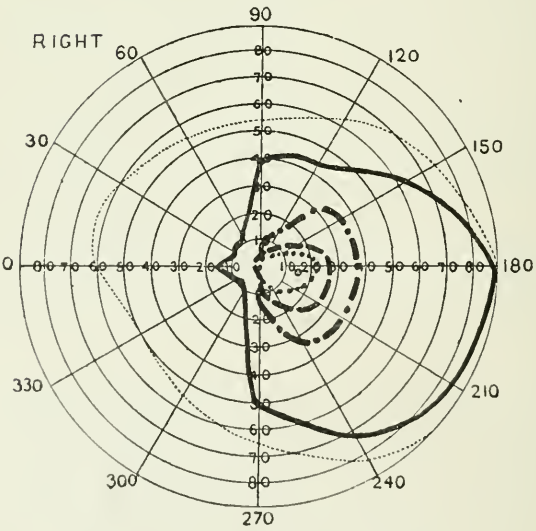


Fig. 14.



Fields of vision, March 7th, 1895.

——— = field for white. - - - - - - - = field for red.
—·—·—· = „ „ blue. ..... = „ „ green.

sionally met with in affections of the chiasma itself, although the cause of this peculiar limitation is undoubtedly to be sought for in the trunk of the nerve. The central vision of the right eye has remained the same during the five months which have elapsed between the two measurements of the fields.

(*March 14th*, 1895.)

Dr. James Taylor observed that he had seen the patient on several occasions, and the appearances were certainly interesting. When he first saw the case he thought it was one of optic atrophy combined with marked myopic crescent. He had recognised the fact that the supposed myopic crescents were in an unusual position, and he did not doubt Mr. Gunn's view that it was a congenital species of coloboma. In respect of the fields of vision, he did not think it was necessary to go beyond the condition of the nerve to account for their form. There was definite evidence that the patient had suffered from optic neuritis, and the condition at present seen was one of optic atrophy with consequent irregular fields. There was no need to imagine some destructive lesion of the visual centres in the brain to account for them. He asked whether the vitreous opacities present were such as were pathognomonic of syphilis.

Mr. Bronner asked whether there was any possibility of lead poisoning.

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2. *Optic atrophy in acromegaly, with charts of fields of vision.*

By R. W. Doyne.

Miss C—, æt. 28, noticed suddenly, four years ago, that she could only see half of objects. About the same

Fig. 15.

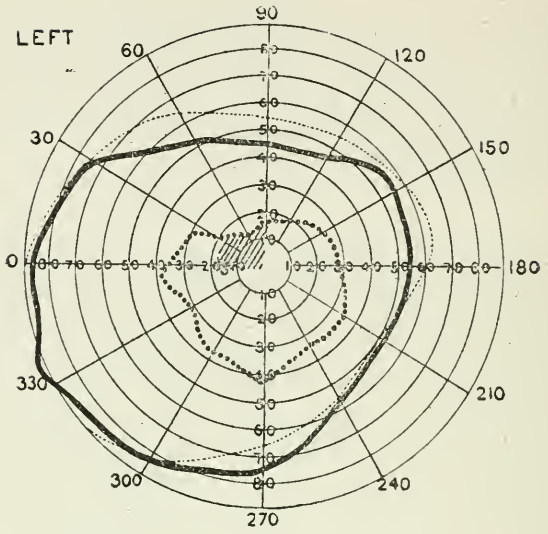
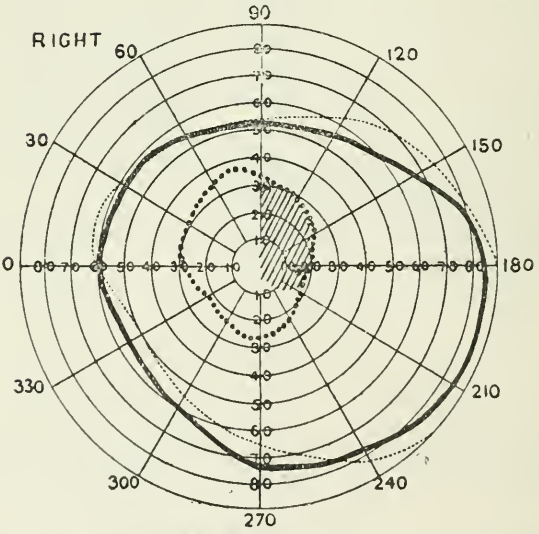


Fig. 16.



Fields on May 30th, 1894.—Continuous line = field for white; dotted line = field for red. In L. shaded area indicates diminished perception of red. In R. shaded area indicates absolute scotoma for colour and form.

FIG. 17.

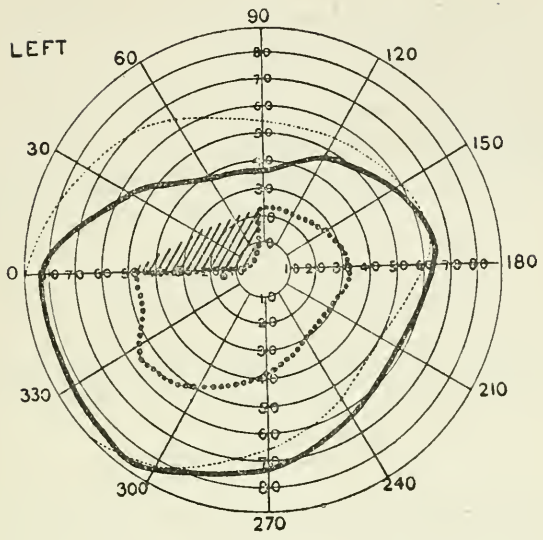
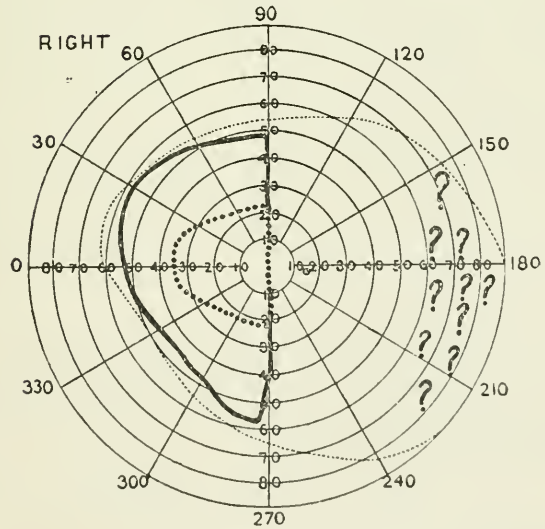


FIG. 18.



Fields on January 7th, 1895.—Continuous line = field for white; dotted line = field for red. Shaded area in L. = scotoma for colour and diminished form vision. In R. faint perception of white object in the area marked ?.

time the right lid used to swell, and latterly left lid. Catamenia only sometimes irregular (ten weeks). V. on January 3rd, 1895, R. $\frac{6}{60}$, L. $\frac{6}{6}$.

Is the atrophy due to pressure of the pituitary body, or to stretching across the bony bed?

Would division of one optic nerve be of any use by the partial atrophy it might cause, or by relief of stretching?

(*Card specimen. June 13th*, 1895.)

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3. *Extreme congestion of optic discs in a case of hypermetropia.*

By R. Marcus Gunn.

Jessie C—, æt. 15, first attended Moorfields Hospital last August. There was a history of convergent strabismus for the last nine or ten years. There had been no headache, nor any other important symptom. R. V. = $\frac{6}{6}$ well; Hm. about 2 D. L. V. = $\frac{6}{24}$; Hm. 2 D. = $\frac{6}{18}$. The left eye squints inwards.

Ophthalmoscopic examination.—Hypermetropia of 5 D.; surface of O. D. elevated about 3 D. above general fundus-level (seen $\bar{c}$. + 8 D.). The condition of the papilla in each, is very like an acute optic neuritis (swelling, blurred outlines, vascularity). Ordered atropine, and afterwards given glasses + 3 D.

The discs have been repeatedly examined since then, and have presented no apparent alteration. The case seems consequently to be a very much exaggerated example of the comparatively common condition of hypermetropic optic disc congestion.

(*Card specimen. January 31st*, 1895.)

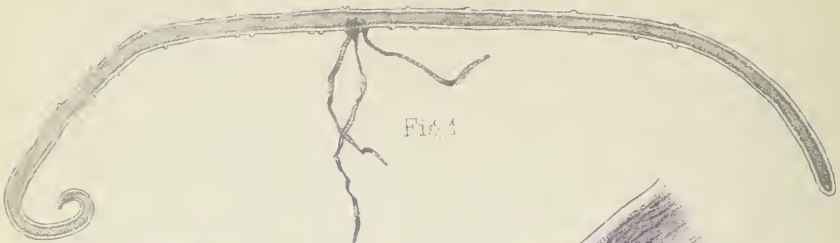


Fig. 1.

Fig. 2.

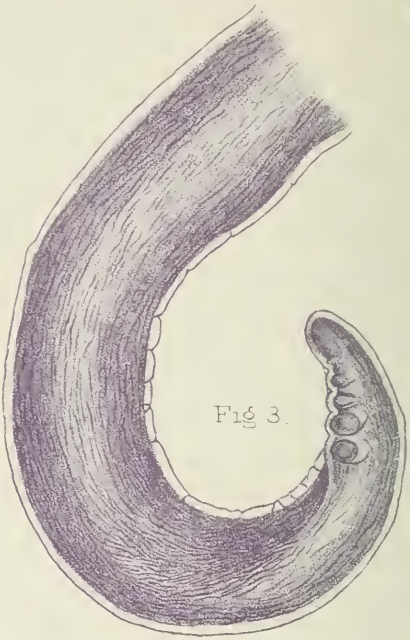


Fig. 3.

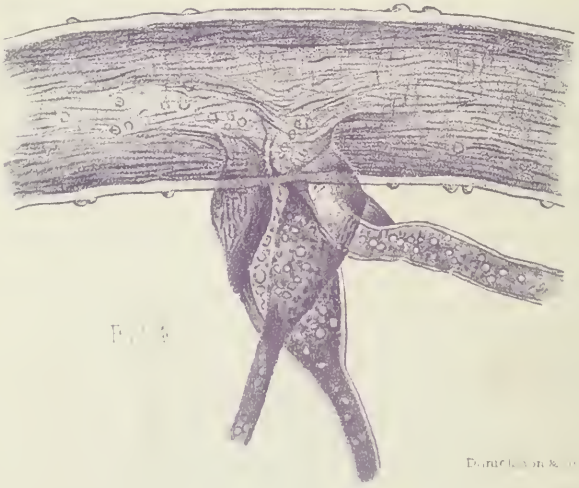


Fig. 4.

PLATE VI

Illustrates Dr. Argyll Robertson's paper on Filaria loa (p. 137).

Male Filaria Loa.

Fig. 1.—The whole worm. Portions of the testicles and alimentary canal protruding through a rupture of the wall of the parasite.

Fig. 2.—The head of the worm.

Fig. 3.—The curved tail of the worm with its papillæ.

Fig. 4.—The ruptured part of the worm with protruding alimentary canal and testes.

VIII. PARASITIC DISEASES.

1. *Case of* Filaria loa, *in which the parasite was removed from under the conjunctiva.*

By D. Argyll Robertson.

(With Plate VI.)

On the 29th of June last I was consulted by Miss J. H— on account of what she termed the presence of a worm in her eye.

She is a slightly anæmic, prematurely grey-haired, but otherwise healthy-looking lady, thirty-two years of age. She has resided at Old Calabar on the West Coast of Africa at intervals, for nearly eight years altogether. She twice had to return home on account of debility following severe intermittent fever. During her last visit to Old Calabar, which extended to about eighteen months, she suffered almost the whole time from chronic dysentery followed by severe remittent fever, which necessitated her return to this country last January in a very weak state of health.

She stated that the worm was first observed by her in February of this year, immediately after her return home. It frequented both eyes, but showed a preference for the left one, sometimes coursing over the surface of the eye under the conjunctiva, sometimes wriggling under the skin of the eyelids—causing a tickling, irritating sensation, but not real pain. It had latterly restricted its visits entirely to the left eye. On account of the remittent fever from which she was still suffering, her bedroom, when she first came home, was kept well heated, and until

she recovered from the fever she noticed that the worm was particularly lively, occasionally causing the eye to become bloodshot, and the eyelids to swell and blacken slightly. As long as she was confined to warm rooms the worm was almost constantly moving about in the neighbourhood of the eye, causing such irritation as to prevent reading or work of any kind. This irritation with accompanying injection always passed off in the course of the day, and never resulted in severe inflammation.

She thus found that the worm was sensitive to cold, coming to the surface when the temperature was high, and disappearing to deeper parts when she was exposed to cold. As soon as she had recovered strength so far as to be able to go out of doors the visits of the worm to the eye became fewer, perhaps a week or longer occurring between them. It usually put in an appearance when she was near a cosy fire or in bed. Its last disappearance was for two months, during July and August, and as she at that time passed a worm *per rectum* she thought she had thus got rid of it. During these two months she was mostly in the open air, but as soon as, in September, the rooms began to be heated, it again came to the surface.

When I first saw Miss H—, in June, I very thoroughly examined the eye, but failed to observe any trace of the parasite, unless perhaps the appearance of a minute bluish vesicle at the extreme outer angle of the conjunctival cul-de-sac corresponded to one of the extremities of the worm, but the vesicle, though watched for a time, did not alter in position or appearance. I gave her strict injunctions to return at any time whenever she felt the worm on the move.

I saw her twice at the eye wards of the Royal Infirmary about the beginning of July, but on these occasions careful inspection was again negative in its results.

On the 12th of September, however, she again came to the Infirmary, stating that she had felt the worm moving about in the left eye that forenoon, and to prevent it leaving the surface she had kept the eye well

covered with a warm cloth till she made her way to the Infirmary. On this occasion, after examining the eye for a minute or two, I observed the worm moving in a tortuous, wriggling manner under the conjunctiva, the surface of which became slightly elevated as it moved along.

It passed with a pretty quick movement over the surface of the sclerotic at the distance of about 5 mm. from the outer margin of the cornea. It glided from the upper outer towards the lower outer part of the globe. There was increased lachrymation and slightly increased injection of the conjunctiva,—just such an appearance as would result from a particle of dust in the eye.

I at once placed my finger on the surface of the globe in such a manner as to prevent the parasite passing backwards until the conjunctiva was pretty well anæsthetised by the application of cocaine. I then got my friend Dr. Maddox, who was present, to apply his finger while the necessary preparations were hastily made for an operation.

She was placed on a couch and the speculum applied, when the pressure of the finger having been removed the wriggling movements of the worm were resumed, as briskly as before the application of the cocaine. I now grasped with a pair of toothed fixing forceps a good fold of conjunctiva over the centre of the wriggling worm, taking care to include in the fold all structures superficial to the sclerotic. I next made with a pair of scissors an incision through the conjunctiva a little nearer the cornea, in such a manner as to lift up a small flap of conjunctiva, and after a little careful separation of the tissues found one extremity of the worm, which I seized with a pair of iris forceps. On now relaxing the fixing forceps the parasite came away readily. No irritation or inflammation followed the operation.

The worm presented the appearance of a piece of fishing-gut, being round, firm, transparent, and colourless. It wriggled slightly for a few minutes after removal while held in the forceps, but on being placed in a

solution of boracic acid, so as to prevent it becoming dry, it seemed completely to lose its vitality. It measured 25 mm. in length and barely half a millimetre in breadth. It terminated rather abruptly at one extremity, scarcely tapering at all, but at the other it gradually tapered to a pretty sharply curved fine point. Twisted round the worm, and apparently attached to it near its centre, was a much finer, less firm, transparent filamentous body, which I at first thought might possibly prove to be a second young filaria, or even the male filaria, but which on further careful microscopical examination appears to be the alimentary canal of the worm protruded through an opening in its musculo-cutaneous wall, caused by the forcible grasping of the parasite with the forceps.

The worm after removal was, on the suggestion of Dr. Muir, Pathologist to the Infirmary, placed in a mixture of equal parts of glycerine and methylated spirits, but the cork of the bottle in which the mixture was put had retained some of the blue colouring matter (methyl violet) of a solution previously in the bottle, and thus the preservative mixture became faintly blue-tinted. The parasite absorbed the colouring matter slightly, but the filamentous body projecting from it absorbed it more freely, becoming markedly blue-tinted. After remaining in the solution between three and four weeks the parasite was carefully mounted as a microscopic preparation in glycerine jelly by Mr. Simpson, assistant keeper of the University Anatomical Museum.

It is not my intention to attempt an account of the natural history of the parasite, as I propose to submit the specimen to some special authority in that department.

I have had some sketches of it made by a competent artist, and these, as well as the preparation itself under the microscope, I have pleasure in exhibiting to you.

It appears to me not improbable that this specimen may be found to supply what has hitherto been a missing link, namely, the male animal.

Since writing this I have had the opportunity of sub-

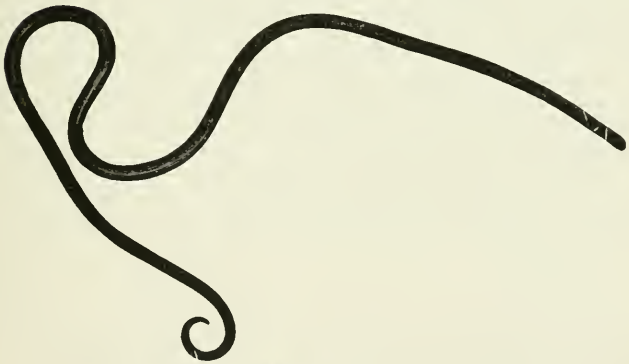
mitting the specimen to Dr. Manson, who at once recognised it as the male worm, and has undertaken to make a careful microscopical examination and description of it.

"*Report by* Dr. MANSON *on the structure of the* Filaria loa, *from an examination of the specimen removed in the foregoing case, as well as of the specimen of the same parasite exhibited at a meeting of the Society on January* 31*st*, 1895. *The latter filaria was removed from the eyelid of a patient by Dr. J. R. Logan, Liverpool.*—

FIG. 19.

Male. Nat. size.

FIG. 20.

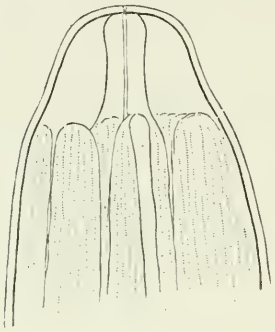


Male. × 6.

Filaria loa: male.—Body filiform, cylindrical, measuring from 25 mm. to 30 mm. in length, by 0·30 mm. in breadth, of uniform thickness, except where it tapers at the head and tail. The cephalic end tapers somewhat abruptly to the simple mouth, which is destitute of papillæ and armature. There is no distinctly marked

neck, but there is a sort of shoulder about 0·15 mm. behind the mouth, where a number of strong muscular longitudinal bands originate to pass down the body. In

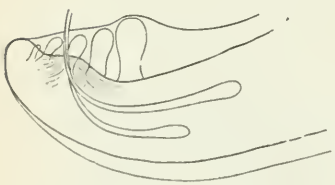
Fig. 21.



Head of male.

one of the specimens the extreme head end is retracted and abruptly truncated, measuring at the free end 0·1 mm. across; in the other worm this part is more conical, and in it a short pharynx can be seen, which opens out somewhat posteriorly. At 0·1 mm. from the mouth the diameter of the worms is 0·15 mm.; further back, at 0·6 mm. from the mouth, it is 0·25 mm. The tail end is sharply incurvated and, perhaps, excavated ventrally; it

Fig. 22.



Tail of male. Dr. Logan's.

Fig. 23.

Tail of male. Dr. A. Robertson's.

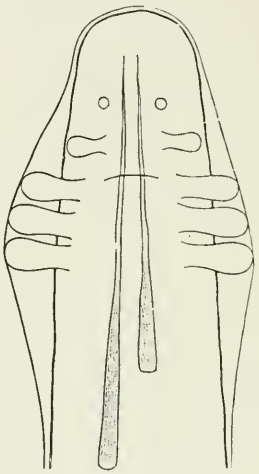
is not spirally twisted. The tail is provided with well-marked lateral alæ, which can be traced forwards to a point 0·3 mm. from the tip of the tail. At the base of the anterior papilla the tail is 0·08 mm. in diameter. There are five well-marked papillæ on each side of the ventral surface of the tail. The three anterior papillæ are præanal and very large, the most anterior being the largest. The papillæ are closely approximated, stout, and bulbous at the free end; they measure 0·04 mm. in length by 0·022 mm. in breadth. The fourth papilla appears to be adanal or post-anal, and is rather more separated from the third than the three anterior papillæ are from each other, and is distinctly nearer the middle line; it is also considerably smaller, 0·03 mm. by 0·01 mm. The fifth and most posterior papilla is very much smaller than the others and differently shaped, being conical and sharp-pointed. It measures 0·014 mm. in length by 0·005 mm. in breadth at the base. There are two slender and unequal spicules projecting from one of the specimens. The cuticle is not obviously striated, but is dotted over with a number of widely scattered, nearly hemispherical, smooth bosses, springing abruptly from the surface. There appears to be no definite arrangement of these bosses; at all events, if they are arranged after a pattern this could not be discerned. The larger bosses are found towards the middle of the parasite; at the head and tail they are considerably smaller, and in these situations they are more sparingly distributed. The larger measure at the base 0·12 mm., and rise about 0·004 mm. above the general surface. The extreme ends of the parasite are not provided with bosses, the first met with being about 1·5 mm. from the mouth and tail-tip respectively.

"Owing to the opacity of the specimens the details of the internal structure cannot be made out. In one worm, as mentioned, a short pharynx can be seen, but its continuation into the œsophagus cannot be traced. The prolapsed testicular and alimentary tubes in one of the specimens

are collapsed and ribbon-like; they are about 0·09 mm. in breadth.

"The following diagram roughly indicates what I conceive to be the arrangement of the details of the under surface of the tail."

Fig. 24.



Diagrammatic.

In endeavouring to ascertain how the parasite entered the system I inquired as to the water and food supply at Old Calabar, and my patient informed me that at Ikörófiön, the mission station at which she resided, the entire water-supply during the dry season was obtained from a spring that bubbled up out of the ground close to the river. During the rains, however, this spring might occasionally be covered by the swollen river, but at that season the water-supply was derived from a tank in which the rain was collected. The water used for drinking was always boiled, and twice filtered. In washing her face she was specially careful to keep her eyes well closed, and if at any time her eyes were sore she bathed

them with the drinking-water. These precautions she took, as it was a popular belief among the natives that the worm gets access to the eyes through the water with which the eyes are bathed. She further informed me that the occurrence of this kind of worm in the eye is well known to natives of Old Calabar, and they use a solution of salt and water as a wash to scare them away. Mosquitos abounded at the station, and any water left standing in a dish soon swarmed with their eggs. The fruit supply consisted of mangos, Avocado pears, bananas, pineapples, oranges, and custard-apples. No uncooked vegetables were used as food.

She herself had seen a number of instances of the worm in the eyes of natives, and thus knew the nature of the affection when she had it herself. It is said in Calabar that they are very difficult to capture. She has never heard of the parasite piercing the skin or conjunctiva.

The ordinary guinea-worm (*Filaria medinesis*) under the skin is unknown in Old Calabar. Miss H— acted as dispenser for about a year during the missionary's absence, and never saw a case of it, nor heard of it occurring during the whole of her residence there.

As a result of inquiry I found that other members of the Old Calabar Mission had been affected with *Filaria loa*.

1. A lady, Mrs. M—, who for a time had resided with my patient at Ikörófiön. She was in this country this year, but has returned to Old Calabar. While in Scotland the worm was seen in her eye by my patient Miss H— and her sister, who is at present engaged in the study of medicine. The latter saw the worm pass from the one eye to the other, crossing the bridge of the nose under the skin.

2. Mrs. H—, the widow of a medical missionary to Old Calabar. I had the opportunity of seeing this lady, and eliciting the following particulars.

She was three years in Old Calabar, from 1860 to 1863, at Old Town Station. Here the water-supply was obtained from a spring which emerged from the ground at a little

distance from the river. Before use for drinking the water was filtered through a porous stone basin, but it was not boiled. The water for washing was not boiled or filtered, nor were any precautions taken to prevent it coming in contact with the eyes. During part of the time she was at Old Calabar she suffered from worm in the eye, sometimes one, sometimes the other was affected, but never both at the same time. She occasionally had a feeling as if the worm were making its way under the skin at the root of the nose, in the eyelids, or on the temple. The left eye was the one chiefly affected. She was invalided home on account of intermittent fever. She did not suffer from dysentery. The worms troubled her occasionally after her return home, but they never came to the surface at a convenient time for removal till in 1875, when her husband, Dr. H—, succeeded in removing a worm from her left eye. She could not now recall the steps of the operation. About a year later another worm was similarly removed by her husband —she thinks from the same eye, and since then she has not experienced any symptoms of filaria. These worms were preserved in spirits, but she fears were, after some years, thrown away.

As in the case of my patient, Mrs. H— noticed that the worms scarcely troubled her at all during winter. It was only in warm weather they were lively. Both ladies occasionally noticed that the worm lay for a short time coiled up and motionless under the conjunctiva. When the worm appeared on the surface Mrs. H— experienced a "biting, nibbling sensation" at the part where the worm was, and the eye became tender and watery, so that she had to keep it closed, but it never produced any severe inflammation. When not under the conjunctiva or skin she was not aware of its presence.

3. The Rev. J. L— went to Calabar in October, 1868, and returned in July, 1872. He often suffered from intermittent fever, on account of which he was invalided, and by medical advice did not return. His recollection

of the time and circumstances of the appearance of the worm is now somewhat faint, but he thinks it appeared during the latter part of his residence in Old Calabar, and certainly troubled him after his return home. As far as he remembers, one eye only, and he thinks the right, was affected, but he cannot say with certainty. It only caused slight irritation, and no severe inflammation. It affected the eyelids, he thinks, more than the eye. He recalls one time in particular when, after preaching at Musselburgh, he felt it wriggling under the skin of the upper lid, and directed the attention of some friends to it, and they saw the movement of the worm. The intervals at which it appeared were irregular, but generally pretty long. He never felt the worm in any other part of the body. As far as he can remember, the visits of the worm to the eye or lids did not generally last long —at most two days. No attempt was made to extract it, nor did any doctor see it. He has seen or felt nothing of the worm for the last eight or nine years, at any rate. He did not notice that the worm was influenced in its visits by the external temperature.

In addition to these cases among members of the Old Calabar Mission, I may refer to the experience of Dr. Thompstone, who was for eighteen months stationed at Opobo, on the delta of the Niger, and who is in this country at present. He informs me that while he was at Opobo he saw two cases of *Filaria loa*. In the one negro the parasite was situated in the lower eyelid at the inner canthus close to the lachrymal sac—the swelling in that region giving the appearance of dacryocystitis. He tried to press out what he considered the contents of the distended sac, when he observed the coiled-up worm to wriggle away into the orbit, and the swelling disappeared.

In the other negro he observed the worm moving about under the conjunctiva when he depressed the lower lid. The patient was affected with slight conjunctivitis. Dr. Thompstone wished to undertake the extraction of the parasite, but the patient declined operative inter-

ference. While at Opobo he neither saw nor heard of other cases of the affection. The water-supply for the native population there was very polluted.

The literature on this subject is very scanty. As far as I have been able to ascertain there have hitherto not been more than twenty cases recorded, and in most of them the accounts given have been bald and short in the extreme. I may, therefore, be permitted to give a short *résumé* of what has been written regarding this filaria.

The first case recorded appears to be that observed by M. Bajon,* a French surgeon, who for twelve years practised his profession in the island of Cayenne and in Guiana. He reports that in July, 1768, the captain of a ship from Guadalupe brought to him a young negress about six or seven years of age, and asked him to examine one of her eyes, in which a small worm, about the thickness of a fine sewing thread, could be distinctly seen. It was about two inches in length. It cruised round about the eyeball in the cellular tissue between the conjunctiva and sclerotic. It moved in a tortuous oblique manner. The colour of the eye was not changed, and the young negress said she felt no pain with the movements of the worm, but she had an almost continual watering of the eye.

On reflecting on the means he should employ to draw it out, he concluded that if he made a minute aperture in the conjunctiva close to the head of the small animal, and then stimulated it to move, it would emerge through the opening. In carrying out this manœuvre, however, he found that in place of escaping through the incision he had made, it passed by the side of it, and went to the opposite surface of the eye. As this proceeding did not succeed with him, he had recourse to the device of seizing the worm by the middle with small forceps, along with the conjunctiva, then making a small deep opening with a lancet by the side of its body, and then introducing

* Bajon's 'Mémoire pour servir à l'histoire de Cayenne et de la Guyane,' t. 1er, p. 325, 1777.

an ordinary needle, whereby he succeeded in drawing it out doubled in two.

Again, in 1771, another young negress, a little older than the last, was brought to M. Bajon suffering from painful inflammation of the conjunctiva. On examination he observed a worm a little longer than in the previous case, and which, like it, moved round about the eye between the conjunctiva and sclerotic. He proposed to employ the same procedure that succeeded in the other case, but the patient would not consent.

He considered that the worm was a dracunculus (dragonneau) similar to those removed from other parts of the body in negroes, only finer and shorter.

The next case recorded is one by M. Mongin, a surgeon at St. Domingo, in the 'Journal de Médecine' for 1770, occurring in a negress who had for twenty-four hours complained of severe pain in the eye with scarcely any inflammation.

At first glance he saw a worm, which appeared to him to wriggle over the globe, but on trying to seize it with forceps he found it to be between the conjunctiva and sclerotic.

To remove it he incised the conjunctiva, and it emerged through the opening. It was one and a half inches long, and the thickness of a violin string, and of an ashy colour. It was larger at one end than at the other, and very pointed at the two extremities. He was inclined to view it as a worm of the blood (*ver sanguin*), as it did not appear to him possible for it otherwise to get into that position without giving rise to pain and inflammation at the part.

We have next several cases that were carefully observed and recorded by M. Guyot, a French surgeon,* who had made many voyages to the Angola coast of West Africa. The first case in which he discovered the filaria was that of a negress in whom, after several examinations, he

* Arrachart, 'Mémoires, dissertations de Chirurgie, et observations de Chirurgie,' 1805, p. 228.

noticed a ridge of the conjunctiva resembling a varicose vein, which induced him to make minute openings over it to empty it. On pricking the elevated conjunctiva with the point of a lancet he was surprised to observe the projection disappear. The patient at the same time stated that she felt something move in her eye, and that the movement was deep-seated. He suspected that this could be nothing else than a roving worm (*ver ambulant*), which sometimes appeared under the conjunctiva, sometimes dived into the posterior parts of the eye. From inquiry he found that a worm in the eye was common enough among natives of that land, and that it was called a "loa," and he consequently applied the term filaria loa to the affection. He saw the worm on many occasions in the eye of the negress, but whenever he touched the spot where it was it retreated to the posterior parts of the orbit. On that voyage he saw several negroes with this affection, for which he employed various collyria without effect.

In 1777 he made another voyage to the coast of Angola. Having many negroes on board the ship he renewed his researches, and found several individuals affected with the disease. As no benefit had been derived from the applications he had previously used he proposed to extract the worm through a small opening in the conjunctiva. To effect this it was necessary to fix the worm, to which end he employed dissecting forceps, without, however, being able to seize it.

On another occasion he employed a ligature needle of medium size, with which he pierced the conjunctiva by the side of the worm, and passed it between the worm and the sclerotic, making it emerge at the opposite side. By this manœuvre he was able to raise the fold of conjunctiva along with the worm on the concavity of the needle. This fold he divided, and drew out the worm without mutilation. The operation required to be done very quickly, otherwise the worm escaped and disappeared, sometimes for a very long time. Of five negroes upon

whom he thus operated he was only able to remove the worm twice. The worms were about fifteen lines in length, and a little less thick than a violin string. He did not think the worms were a species of dracunculus, for they were quite white, firmer, and less long in proportion. He never saw the worm make an opening for itself. In the seven voyages he had made to the Angola coast he had never seen a negro affected with dracunculus. Other surgeons who had sailed on these coasts assured him they also had seen no cases, which made him conclude that the negroes of that country are not subject to dracunculus. The cases on which he operated were healed in twenty-four hours.

We next find M. Clot at a meeting of the Académie Royale des Sciences in December, 1832, referring to the case of a negress, who suffered from a dracunculus under the conjunctiva of the eye. It appeared now and then gliding between the conjunctiva and sclerotic, lifting up the conjunctiva. This case appears to be one that was seen by Dr. Roulin at Monpox in America.

Another case is mentioned by Dr. Sigaud in his work on the 'Climate and Diseases of Brazil.' He states he was witness in 1833 of the extraction, by M. dos Santos, of a filaria situated in the orbit on the surface of the sclerotic of a negress.

In 1838 Dr. Guyon made an interesting communication to the French Academy of Sciences, in which he narrated the case of a young negress affected with two filariæ, one in the right and the other in the left eye, but occasionally both appeared in the same eye; the passage of the worm from the one eye to the other occurring with great rapidity through the cellular tissue under the skin at the root of the nose. The filariæ were in different eyes when the operator (Dr. Blot of Martinique) extracted the filaria from the left. Some hours after, when he returned to extract the other worm, he found that it had passed to the left eye, from which he extracted it by a fresh incision.

The first cases reported by an English surgeon were by Dr. Lony, a naval surgeon, occurring in two Kroomen, whom he saw while cruising on the West Coast of Africa during 1841–2. In both he succeeded in extracting the parasite.*

Another case was observed by Dr. Mitchell at Trinidad in the person of a young negress, in whom the worm appeared at long and uncertain intervals for four or five years before he had the opportunity of seeing it. At length in 1845 Dr. Mitchell saw the worm twisted like the letter S lying motionless under the conjunctiva, midway between the edge of the cornea and the inner canthus. Extraction of the worm was deferred to enable six or seven of his medical brethren to observe so unusual an appearance, with the result that when they assembled the following morning the parasite had removed itself to deeper parts.†

A case is also recorded by Gervais and van Beneden,‡ in which M. Lestrille succeeded in 1854 in extracting a filaria from a negress, and Dr. Guyon once more, at a meeting of the French Academy of Sciences in 1864, exhibited another filaria, which had been removed by a French naval surgeon from a negro of the Gaboon. The filaria was of unusual size, measuring fifteen centimetres. Its length was such that the whole of it could not be seen at one time below the conjunctiva, part always remaining embedded in the deeper parts of the orbit.§

Dr. Morton ‖ reports a case occurring in a negress residing at Gaboon in West Africa, in which a native woman succeeded in extracting the parasite. The worm, preserved in gin, had been sent to him by a missionary, the Rev. Dr. Nassau, in the district, who informed

* 'Lancet,' vol. i, 1844, p. 309.

† Ibid., Nov. 26th, 1859.

‡ 'Zoologie médicale,' 1859, vol. ii, p. 143.

§ 'Annales d'Oculistique,' 1864, p. 241.

‖ 'American Journal of the Med. Sciences,' 1877, vol. lxxiv, p. 113.

him that although he had been very many years in that country, and had often heard of the parasite, this was the first specimen he had been able to secure. The missionary himself appeared to be also affected with filaria, which, however, did not appear on the eye, but could, he said, occasionally be felt under the skin of the fingers, and once in the skin of the lower eyelid, from which position he attempted himself to remove it with scalpel and forceps, but he did not succeed, the worm wriggling away across his cheek. The worm that was sent to Dr. Morton measured 16 mm., but was in too badly preserved a state to permit of accurate examination.

Lastly, in Dr. Davidson's work on hygiene and diseases of warm climates (p. 962) Dr. Manson, who writes the article on filaria, reports the case of a negro who had been affected with *Filaria loa*, and in whose blood he afterwards found the *Filaria diurna*, and raises the question whether the *Filaria loa* may not turn out to be the female parental form of the *Filaria diurna*.

I am afraid we must confess that we are as yet very ignorant of many points connected with the life history of the *Filaria loa*. With the adult female parasite we have a limited acquaintance, but till now we are ignorant of the appearance of the male worm. The larvæ have been observed in the interior of the adult, but what their further course is, what transmigration may occur, ere they reappear as fully formed filariæ under the conjunctiva has yet to be discovered. The only observation that bears at all upon this question is that made by Dr. Manson and reported in Dr. Davidson's work, that in one case of *Filaria loa*, the *Filaria diurna* was afterwards found in the blood. With the view of ascertaining whether the *Filaria diurna* was present in the blood of my patient Miss H—, and also with the view of getting a report as to her general medical condition, I got my friend Dr. Alexander Bruce to undertake the examination.

It must, however, be borne in mind that in her case

the filaria removed proves to be a male, and, unless she were affected with the female parasite as well, no embryos could be expected in the blood.

Report by Dr. Alexander Bruce, October 16th, 1894.—"Miss H—, missionary to Old Calabar, went there at the age of twenty-two, has been out there ten years altogether; first was out for two years, then furloughed for one year on account of an attack of intermittent fever which turned her hair grey, but was not otherwise very severe in type. Then she was out for four years and home for one year on furlough. Then was out for seventeen months, invalided home in January, 1894, for remittent fever, gastritis, and a form of dysentery and great anæmia. The remittent fever began in December, 1893, with delirium at beginning, and fever which rose daily to 102° and 103° F. She was sent to sea in ten days, and on the way home the temperature on one occasion rose to 107°; this was reduced by ice-pack. Improvement was slow, being retarded by the gastritis and dysentery, and the tendency to pyrexia did not abate till the end of June. The gastritis was indicated by intense pain (agony, she called it) in swallowing anything, whether solid or fluid. The bowels now move only once daily or less frequently, and the motions are accompanied by small flakes of mucus (formerly by blood). There was always great mental depression during the attacks of dysentery.

"The arms became, since June, stiff and swollen, especially on awakening from sleep (whether at night or during the day), and the hands felt 'numb,' 'dead,' 'as if asleep,' or 'as if they didn't belong to her.'

"She was so weak that she had to remain in bed till the beginning of April. Since then, after a visit to Crieff, she has improved rapidly, and can now walk two or three miles easily. She now has a fairly good colour, has good appetite, and no pain in the stomach. Examination of the circulatory system shows absolutely nothing abnormal, no dilatation of the ventricles, no arterial, valvular, or

venous bruits. The respiratory murmurs and the percussion note of the lungs are normal. The liver is not, and the spleen is, just appreciably enlarged. The blood flows readily from a prick in the finger; it is rich red in colour. The red corpuscles are well-coloured, well-formed, and form rouleaux readily. There is a slight increase in the white corpuscles. Specimens of the blood drawn at 9 a.m., 8 p.m., 9 p.m., 1 p.m., and dried on the slide showed no evidence of filaria of any kind.

"The forearms presented, on the anterior and posterior aspects, slight flattened doughy swellings, which had no definite boundary and were not painful to pressure. There was no alteration in the colour of the skin over them."

We are still at a loss to account for the entrance of the worm into the body. There are, I think, two different channels by which it might possibly find access. First, by the passage of the embryo filariæ directly through the conjunctiva, being brought in contact with the eye in water used for washing the face or bathing the eye. This I think an unlikely means of entrance, as in my patient special pains were taken to avoid such a possibility, and yet she became affected with the disease, and the power of the worm to penetrate skin or mucous membrane has never been demonstrated. Second, by the swallowing of the embryo filariæ along with articles of food or drink. Although in the case of my patient excellent measures were taken to secure the purity of the water-supply, and although the nature of the food was such as not readily to lend itself to the conveyance of impurities, still I think recent researches, made more particularly by Dr. Manson with regard to the development of the *Filaria sanguinis*, render it probable that the ova of the *Filaria loa* are, as suggested by Dr. Manson, taken into the circulation of the patient affected by the mature female parasite. That then some insect of predatory habits, drawing its food-supply from this polluted

stream, becomes, in its turn, the host which supplies the necessary elements for the further development of the parasite. This insect, in its turn dying, deposits the embryo filariæ in water, which, being used for drinking purposes, permits the parasite once more to affect man. Which the insect is that probably plays the part of intermediate host is as yet unknown. This view is purely hypothetical, but I think, reasoning from analogy, the most probable one of the development of the *Filaria loa*.

The geographical distribution of this parasite appears to be a very limited one, as almost all, if not all, of the persons affected, whose cases have been reported, have either been natives of or been long resident on a limited area of the West Coast of Africa, including Congoland and Old Calabar. If Dr. Manson's view as to the mode of development of the worm be substantiated, then naturally the area of the disease must necessarily be limited to the regions in which the intermediate insect host is to be found.

The fully grown worm may, judging by some of the cases recorded, infest the human subject for a good many years, and may yet not give rise to any very serious symptoms. It possesses very considerable locomotive powers. It is capable of wandering at will from one eye to the other, to disappear into the deeper parts of the orbit, to wander under the skin of the eyelids, and even to make excursions in the temporal region. These seem to be the limits of its excursions. No doubt the Rev. Dr. Nassau (the missionary at the Gaboon) had sometimes sensations of a filaria under the skin of the fingers as well as under the skin of the eyelid, but it is doubtful if this was a true case of *Filaria loa*, and even then if the worm had made its way from the fingers to the eyelid. At the same time it must be borne in mind that there are few regions of the body in which the skin is so thin as in the eyelids, whereby the presence of a small filamentous body can easily be discerned. The

parasite might readily move about under the coarser cutis of other parts and yet escape detection.

The sensitiveness of the parasite to cold appears to be fully established by the experience of my patient and Mrs. H—, and it is possible that a prolonged residence in a cool climate may eventually prove fatal to the worm, as seems to have occurred in the case of the Rev. J. L—. All the cases previously recorded have occurred in negroes, but those I have brought forward prove that Europeans are also susceptible to the attacks of this worm.

I think I am warranted in saying that the disease is not very rare in the district favoured by the parasite, as, although the number of cases reported is small, the irregular intervals at which the worm comes to the surface, and the slight irritation or annoyance its presence causes, often prevent those affected seeking surgical advice ; while it must be admitted that medical assistance is not very readily procured in large parts of the district where cases occur.

The interest connected with the elucidation of the obscure points in the natural history of the worm will, I trust, stimulate those of our profession residing on the West Coast of Africa to undertake the further necessary investigations.

(*October* 18*th*, 1894.)

Dr. Patrick Manson.—I have no hesitation in saying that I consider the communication to which we have just listened from the President to be one of the most important on the subject of filaria loa that has been made for many years. Two or three years ago I had an opportunity of examining the blood of a number of negroes from Old Calabar in a missionary establishment and elsewhere, and I made the interesting discovery that in 50 per cent. the blood contained the embryos of a species of filaria—*Filaria perstans*—which were quite different in their zoological characters from the filaria of the blood, with which every one must now be familiar. While exa-

mining one of these patients whose blood contained this new species of filaria I found another species of blood-worm, whose anatomical features were similar to those of the ordinary *Filaria sanguinis*, but which presented a very great difference physiologically, inasmuch as contrary to what is observed with the ordinary filaria, this one disappears at night and can only be found in the blood during the daytime. This second new bloodworm I therefore called *Filaria diurna*. Some time later, in a communication which I had from Professor Leuckart, he told me he had been enabled to examine the embryos in the uterus of an adult *Filaria loa*, and he sent me a sketch of these embryos. On comparing this sketch with the *Filaria diurna*, I came to the conclusion that they were practically identical, and therefore that the filaria I had found in the blood of the negroes might possibly be the embryos of *Filaria loa*. This opinion appeared to me to be strengthened by the fact that this patient had previously had a loa under the conjunctiva. I have very little doubt that the embryo of *Filaria loa* finds its way into the blood. Clinically, there is no evidence of its attempting to find its way to the surface of the body, and it is evident that there must be some arrangement by which it can get out of the body, and so propagate its species by passing from one person to another. From this and other considerations I consider that it must be by way of the blood that the necessary escape is effected. With the ordinary filaria it is now well known that the mosquito removes it from the blood and acts the part of intermediate host, and I suppose that a similar arrangement must exist in respect of the *Filaria loa*. On inquiring of the Old Calabar negroes as to the blood-sucking insects of the district, I learned that there was a particular fly which exists in great numbers about the creeks, and was very annoying on account of its pertinacity. I think this insect, which is also diurnal in its habits, is probably the intermediate host for the *Filaria loa*, as the mosquito is for the ordinary filaria. I do not believe that this indi-

vidual worm was the only *Filaria loa* in the body of the patient whose history we have just listened to. It became visible simply because it wandered to a spot where it could be seen ; elsewhere in the connective tissue I opine there are others. The patient was first seen in February, and whether sufficient time has intervened for the maturation of these parasites and the evolution of their embryos I cannot say. None, it is true, were found in the blood, but the specimen was a male, and from this it is impossible to say what the degree of maturity the embryos of any females present may be. I think the blood should be examined again, and I would suggest that if possible a similar examination should be made of the other members of the mission, and of the patients the President referred to. The locomotive habits and sensibility to cold of this parasite are particularly interesting in respect of the way in which they subserve its interests, on which they certainly have a bearing. The measurements of the *Filaria loa* usually given, as ascertained by looking over the literature of the subject, are from 17 mm. to 70 mm. The smaller measurements are explained by the author's case ; they apply presumably to the male parasite, which in the filaridæ is almost invariably smaller than the female. One measurement given, 15 cm., is so enormous that I question the accuracy of the observation, or, if the measurement were exact, it must have referred to some other parasite than *Filaria loa*. With respect to the nature of the protrusions from the body of the parasite under the microscope, one of them is certainly the alimentary canal ; the other is probably the testis ruptured in two. One must be careful in coming to a conclusion about these and similar connective-tissue parasites. There are four or five whose young inhabit the human blood ; and there are others whose young appear to have a different history. Especially in West Africa do we find such parasites. There is the guinea-worm, said, however, not to be found in Old Calabar ; it certainly is found in the neighbourhood ; its name signifies an African origin.

There is the *Filaria perstans*, the *Filaria nocturna*, and also a very minute bloodworm, *Filaria demarquayi*, the parental form of which, as of *F. perstans*, has not yet been found. There is the *Filaria volvulus*, which resembles the *Filaria loa*, in that it lives in the subcutaneous cellular tissue. Not long ago Professor Magalhães, of Rio Janeiro, described a species of filaria which he found in the left ventricle of the heart, which is also probably a new species. It follows, therefore, that before venturing on the diagnosis from specimens of parasites found in the blood or connective tissues, usually more or less mutilated, one requires to be very careful. One singular fact about the *Filaria loa* is that it will not live in the West Indies. It has been introduced many times, but does not spread. It has been removed from the eye there from imported negro slaves, but it has not become acclimatised. In this respect it resembles very closely the *Filaria medinensis* (guinea-worm), which was introduced times without number during the days of slave importation into the West Indies, yet it has died out altogether except in one or two places, the island Curaçao and a limited district in Brazil. This undoubtedly is in consequence of one of two things; either the habits of the people, or the absence of the proper intermediate host. In respect of the guinea-worm the intermediate host is a fresh-water cyclops. I recently had a case in the Seamen's Hospital from which I was enabled to procure the embryos. This enabled me to carry out some experiments which I would urge upon those who have the opportunity to repeat. When the guinea-worm arrives at maturity a little vesicle or bulla is formed on the ankle or foot. The vesicle ruptures, and on careful examination you will see a small orifice in the centre in which sometimes the head of the worm may be seen, but not always. If you take a sponge and drop some cold water, not on, but in the neighbourhood of this orifice, you will see the hole become filled with a white grumous material, which under the microscope, and on adding a little water, is

seen to be a wriggling, writhing mass of embryos. The application of water to the leg after an interval may lead to further extrusion of embryos. This is a striking illustration of the curious way nature has adapted the habits of the guinea-worm to its requirements. The young guinea-worm lives in water, and probably for this reason the mature worm descends to the feet or ankles, the parts of the human body in tropical countries most often within reach of water. Having procured in this way a supply of embryos, I tried to repeat the experiment described by the Russian naturalist, Fedschenko, on the metamorphosis of the embryos of the guinea-worm in its intermediate host. I obtained some fresh-water cyclops and placed them in water with the embryos. After five or six hours I took one of the cyclops and placed it under the microscope, and I found the body-cavity to contain twenty or thirty of the living and moving embryos. The next day, however, the cyclops were all dead, but the contained embryos were all lively. Having still one or two of the cyclops left I repeated the experiment, but, proceeding more cautiously, placed only a few of the embryos in the water along with the cyclops. After a few hours I removed the cyclops, and found that each of them had two or three guinea-worm embryos coiled up or moving about in their insides. Two of the cyclops I kept alive; one lived sixteen days and the other five weeks, and during this time the embryos could be seen moving and developing. At the end of five weeks I killed the cyclops, and I found the guinea-worm embryos had undergone a certain degree of development. The outer cuticle of the embryo had separated a good deal from the body—ecdysis, and there were certain changes in the alimentary canal. I have no doubt that had the cyclops been in a normal condition as regards exposure to light and sun, the metamorphosis of the guinea-worm inside the cyclops would have been completed. This shows that it would be possible to introduce the guinea-worm into England if we

did not wear boots or shoes, and if we were in the habit of wading about in pools and marshes as do the natives of West Africa. There would be a discharge of the embryos into the water, and if less care were taken about the purity of the water-supply, and supposing there to be no adverse climatic influences, the worm would become common. This little story about guinea-worms shows how these and similar parasites pass from one man to another; and it shows how slight differences of habit, absence of intermediate host, and so on, govern the distribution of a parasite like *Filaria loa*. If you examine this *Filaria loa* exhibited by the President under the microscope, you will see that all over the skin there are minute but regular bosses or protuberances. This occurs in certain filariæ, but in no other human species so far as I am aware. These protuberances, I have no doubt, have a bearing on the locomotive habits of this particular parasite. I pass round a reproduction by Blanchard from a book which carries us back a century further in the history of the *Filaria loa* than that given by Dr. Robertson. This book was written by Pigafetta,* and it contains a picture showing a man drawing a guinea-worm out of his leg, and a woman having a worm removed from the eye, doubtless a *Filaria loa*.

Further Note of Case of Filaria loa.

By D. Argyll Robertson.

(With Plate VII.)

At a meeting of this Society on the 18th of October last I narrated the case of a patient, Miss H—, affected with *Filaria loa*, and I exhibited a male worm which I had removed from under the conjunctiva of her left eye. I purpose now to give a short account of the further history of that patient, and a description of a female *Filaria loa*

* 'Vera descriptio regni africani, quod tam ab incolis quam Lusitanis Congus appellatur,' Frankfort, 1598.

PLATE VII

Illustrates Dr. Argyll Robertson's paper on Filaria loa (p. 162).

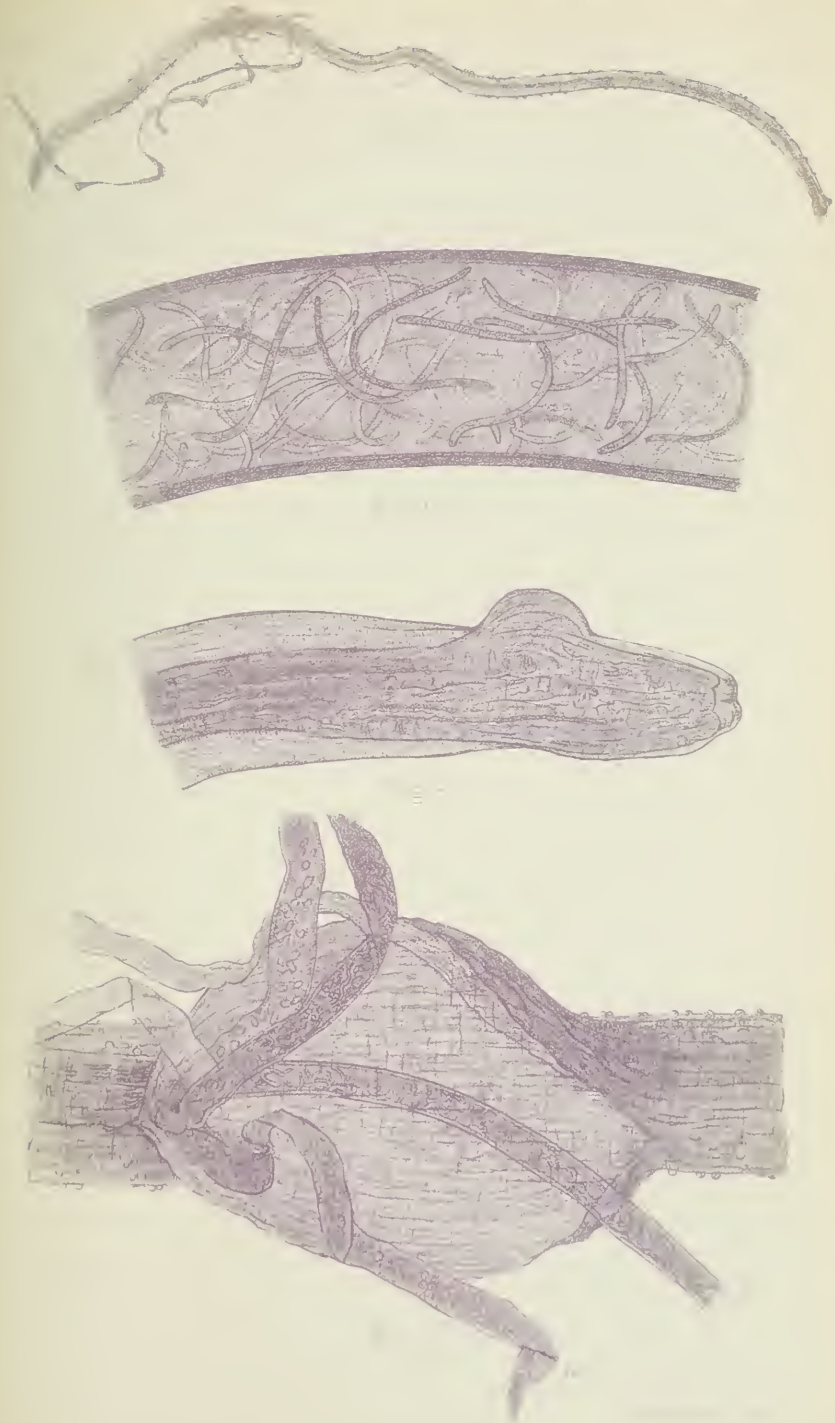
Female Filaria Loa.

Fig. 1.—The whole worm. Portions of alimentary canal and uterine tube protruding through an opening in the wall of the parasite.

Fig. 2.—A portion of uterine tube, highly magnified, showing embryo filariæ in interior.

Fig. 3.—Head of worm, with rounded projection of wall of worm at one point, due to injury.

Fig. 4.—Part of worm where rupture of wall occurred. *a*. Alimentary canal. *b*. Uterine tube with embryo filariæ.



which I succeeded in removing from her right upper eyelid.

After the removal of the filaria from under the conjunctiva, Miss H— was not troubled with the sensations she associates with the presence of a worm for a period of about six weeks, when again she experienced a burrowing sensation at the back of her left eye. It affected her at intervals, and especially when she was occupying a hot room.

On the 3rd of February she distinctly felt a worm moving about in her left upper eyelid, and came at once to me, but before she arrived this feeling had gone, and I failed to discover any signs of the parasite. She returned on the 6th of February with the statement that not only had she felt the worm moving about in the left lower lid, but that it had also been distinctly seen wriggling under the skin. I saw her three different times that day, but failed to observe anything that might indicate with certainty the presence of a parasite, although she sat in front of a hot fire and had a succession of hot poultices applied, so as to tempt the worm to the surface. On the third visit, as she felt the wriggling of the worm, and as there seemed to be a little fulness at one point in the left lower lid, I decided to cut down at that point and search for the parasite. This I did with Dr. Mackay's assistance, having first of all applied clamp-forceps so as to prevent the worm escaping if it were there. I failed to find any parasite, although I made a careful search, and the patient showed great nerve and steadiness under operation, but I noticed a distinct narrow channel or burrow parallel to the edge of the lid, and crossing about the middle of it, which gave me the impression of being a burrow by which the worm had moved across the lid.

Two days later Miss H— came complaining of a swelling in the right temporal region. This swelling seemed pretty deeply situated, and firm palpation failed to reveal any corded feeling such as might indicate the presence of a worm.

On the 13th of February she felt the worm wriggling

across the right upper eyelid, and then it appeared to her to remain coiled up under the skin. She bound the eye carefully up and came at once to the infirmary. I examined the lid and noticed a fulness at the upper inner part, which might be a coiled-up worm. By pressure of the fingers I attempted to force the swelling towards the edge of the lid, but I could neither see nor feel any movement such as might be expected from the presence of a worm. As, however, the patient's sensations were very distinct, I determined to make an exploratory incision. I applied the clamp-forceps and made a free incision over the region of the swelling, but found the chief cause of the fulness to be a small deposit of fat, which I cut away, and then proceeded to explore the neighbourhood carefully. After some dissection I found a very fine transparent filamentous body. On drawing upon it with forceps it came away with a snap. It was much smaller in calibre and shorter than the usual *Filaria loa*, and I concluded that it was only a portion of a filaria—the main part being caught between the blades of the clamp-forceps. The forceps being removed, further exploration was made, in which I was assisted by Dr. Mackay, and after some dissection a well-marked *Filaria loa* was discovered deeply embedded in the muscular tissue and removed with forceps. The edges of the incision were brought together by a couple of fine sutures, and healing occurred by first intention.

The worm thus removed measured about 30 mm. in length and nearly 1 mm. in thickness. It was firm and transparent like a small piece of fishing-gut. It tapered at either extremity to a blunt point, the tail being rather sharper-pointed than the head. At the distance of about 9 mm. from the caudal end an opening existed in the wall of the parasite, through which protruded a filamentous coil, which subsequent microscopic examination revealed to be the uterine tubes filled with ova in all stages of development up to embryo filariæ. Notwithstanding the amount protruded, the interior of the parasite was yet to a great extent occupied by oviduct, the alimentary canal

being apparently comparatively small in size. The wall seemed to be chiefly composed of muscular fibre, the transverse striæ of which were readily visible at all parts. The semicircular projecting tubercles, which Dr. Manson is inclined to view as serving to facilitate the gliding movements of the parasite by enabling it to get a purchase on surrounding parts, were very numerous towards the caudal end, fewer in number at the centre, and very sparsely distributed at the head extremity. Near the oral end of the worm a small general projection of the wall existed on one side, probably due to a partial rupture produced by injury.

The small piece of the worm I first removed in the course of the operation proved on microscopic examination to be part of the oviduct containing embryo filariæ.

I will submit my specimen for more careful and thorough examination and report to Dr. Manson, who is entitled to speak with such authority on this subject.

During the last six months I have at intervals examined blood drawn from Miss H— at various periods of day and night, but have never been able to discover the presence of any filariæ.

My patient has several times directed my attention to ill-defined swellings under the skin of the forearms a little above the wrists, over the dorsal surface of the radius, more marked generally in the right arm. The surface of the swellings was not quite uniform, but did not give one the idea of being produced by a coiled-up worm. The swellings measured about half an inch in diameter. They were not painful, but occasioned a feeling of stiffness when the arms were used. The swellings occurred at irregular intervals, and were generally most marked in the mornings. Cold had no influence in dispelling them; on the contrary, the application of cold water on one or two occasions seemed to bring the swellings forward.

My patient informs me that natives of Calabar, and others resident for a time there, are subject to such

swellings in the forearms and wrists, to which the natives apply the term "Ndi töt," or swelling. These swellings she has only suffered from since her return home.

I have further a correction to make in the history of my patient I previously submitted. It would appear that while she was most careful with regard to the purification of her drinking-water by boiling and filtering, she was for ten days prior to leaving Old Calabar so completely prostrated as to be unable to attend to any household matters, and the person who undertook her duties was unacquainted with the procedure employed for purifying the water. It might thus readily happen that she at that time partook of impure water containing embryo filariæ. As she had no symptoms of filaria till after her return home, this *might* explain their entrance into her system.

It is easy to understand how the embryo filariæ may enter the system, although their presence in impure water has not yet been demonstrated. And it is easy to conceive that, having entered the system from the alimentary canal, they may breed and bring forth a large crop of embryo parasites. But the chief difficulty consists in determining how these embryo filariæ escape from the bodies of those affected with the disease, and get deposited in the impure water and thus propagate the disease.

In the case of the *Filaria sanguinis* this is accomplished by the mosquito which constitutes the intermediate host; but as in the case of my patient, as well as in the case reported by Dr. Logan of Liverpool, careful examination of the blood failed to reveal the presence of embryo filariæ, some other system of propagation than that by blood-sucking insects must be looked for. Possibly the embryo parasites may be discharged along with some of the excreta from the body, and from faulty sanitary arrangements find their way into drinking-water. Whether this be so or not, future investigation will probably show.

Report on the structure of the female parasite (by Dr. Manson).—Female *Filaria loa :* length, 3·25 cm.; breadth,

0·5 mm.; ova at morula stage, 0·03 by 0·02 mm.; length of outstretched embryos in uterus, 0·25 mm.

As regards her general appearance, the female *Filaria loa* resembles the male parasite, only she is considerably larger and her tail is straight, tapers to a diameter of about 0·1 mm., and is then abruptly truncated. The mouth, the head, the stout muscular ring just posterior to the mouth, the stout longitudinal muscular bands, and the bosses on the integument resemble exactly those of the male worm. In consequence of the mutilation of the specimen it is impossible to say where the vagina opens, or where the anus is placed. The uterine tubes are stuffed with embryos at all stages of development. The more mature embryos resemble in size and shape those of *F. nocturna* and *F. diurna*, but in consequence of the method of mounting it is impossible to say if they are possessed of a sheath or not. If they are possessed of a sheath, I should say that they are practically indistinguishable from the parasites mentioned. (*March 14th*, 1895.)

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2. *A case of hydatid cyst of orbit; removal of cyst, with preservation of eye and vision.*

By J. B. Lawford.

Ethel C—, æt. 17, a patient of Mr. Kirby (Deptford), came under my care at St. Thomas's Hospital on September 27th, 1894, complaining of pain in, and increasing prominence of, her right eye; noticed for about two months. On examination the following conditions were noted:

R. E.: moderate proptosis, with some displacement of globe downwards and outwards. Rotation of eyeball limited upwards and inwards, and very slightly outwards. Slight puffy œdema of eyelids, a little conjunctival con-

gestion. Cornea and iris normal. V. = $\frac{6}{18}$ and 2 J.; +0·75 D. = 1 J. Ophth.: O. D. swollen, apex of swelling focussed with +5·5 D. Retinal veins very dilated and tortuous, a few small retinal hæmorrhages at margin of swelling. No choroidal changes discernible. Some pain caused by backward pressure of eyeball. No new growth to be felt in orbit. No bruit or pulsation. No evidence of disease in the bony cavities adjoining the orbit. No enlargement of pre-auricular or other gland.

L. E.: nothing abnormal in appearance, position, or movements. V. = $\frac{6}{6}$ and 1 J. Fundus healthy.

October 4th.—Second attendance as O. P. Proptosis of R. slightly greater; otherwise condition of eye unchanged. Patient has had two attacks of vomiting since last visit; pain has been rather less severe.

11th.—Third attendance. Pain much less. Proptosis has increased; the eyeball is displaced further downwards, and its upward rotation is very limited. On the nasal side of and above the eye, between it and superior margin of orbit, a soft resistent mass can be felt, deeply situated in the orbit; no fluctuation can be made out. The swelling of optic disc is still very marked; numerous hæmorrhages in retina immediately round O. D.

Patient taken into the ward for operation.

The notes and history obtained after admission are by Mr. J. F. Rudall, Ophthalmic House Surgeon. Some of the facts now given were ascertained only after the operation had settled the diagnosis.

Patient is a well-nourished, rather anæmic girl, who has generally had good health. Is the second of four living; one child died in infancy of measles. Had scarlet fever when a child; last spring had a cough lasting for some weeks, during which she had slight hæmoptysis (her own statement). No night sweats. She has not suffered from glandular enlargement or abscess. In the family history the only important item is an account of death from consumption of three brothers and one sister of patient's mother. No history of tumour obtained.

The patient has lived all her life in England, and almost wholly in large towns—Tynemouth, Sunderland, Edinburgh, and London. Dogs were not kept by her parents, nor has she ever lived in houses where they were kept indoors. The girl exhibited no physical signs of disease other than those pertaining to the right eye and orbit, and the latter did not differ materially from those already mentioned before her admission, except that the visual acuity of the right eye had further diminished to $\frac{6}{24}$, and the proptosis had slightly increased.

13th.—Patient anæsthetised by ether followed by chloroform. A curved incision was made in upper lid near the nasal end of the upper bony margin of orbit, and after a little dissection a tense, elastic, fluctuating tumour was exposed, situated between the eyeball and the orbital roof, deeply behind the trochlea of the superior oblique tendon. An exploratory puncture was made, and a clear thin fluid removed by a syringe; after the withdrawal of the syringe a quantity of similar fluid escaped from the cyst, which then collapsed. The opening in the orbital tissues immediately in front of the cyst was then enlarged, and by means of a pair of forceps the cyst was easily removed entire. After cleansing the cavity the outer wound was closed with three sutures, a small rubber drainage-tube inserted, and an iodoform and gauze dressing applied.

The subsequent history, as far as the operation is concerned, may be very briefly given. The wound healed rapidly; the drainage-tube and the last of the sutures were removed on the 18th, and on the 22nd the dressings were omitted. The proptosis steadily decreased from the time of the operation, and the movements of the eyeball soon became normal except rotation inwards; this remained in abeyance. The swelling of the optic papilla and dilatation of retinal veins subsided rapidly, and sight began to improve. On October 25th (eleven days after operation) R. V. = $\frac{6}{9}$ partly and 2 J. slowly. Patient left the hospital on November 2nd. On November 15th the

following note was made:—R.: divergence persists, and inward rotation beyond mid-line is wanting; upward rotation perhaps slightly defective; other movements of eyeball full. There is still slight proptosis, and some thickening can be felt behind scar of incision. V. = $\frac{6}{12}$; +1 D. = $\frac{6}{9}$. Ophth.: still slight turgescence of retinal veins; little, if any, swelling of optic papilla; no hæmorrhage.

November 29th.—Nothing fresh to be noted.

December 13th.—R. divergent, no rotation inwards beyond mid-line; other movements full. Diplopia in all directions except to patient's right. Proptosis scarcely appreciable. No thickening now behind scar. No pain or tenderness. V. = $\frac{6}{9}$ and 1 J. Ophth.: nothing abnormal in fundus except two or three small yellowish bright spots in retina near the macula.

There seems no doubt that the internal rectus was inadvertently divided during the operation; at least, this seems the most likely explanation of the complete loss of inward rotation of the right eye.

Patient is in good health, has gained flesh, and is less anæmic than at the date of operation.

The fluid removed from the cyst was examined, and found to contain a large percentage of chlorides and a trace of albumen. The quantity obtained was insufficient to allow the determination of the specific gravity. The appearances of the cyst wall were those usual in hydatid cysts, and on microscopic examination the typical lamination was well seen. No hooklets could be discovered in the fluid removed from the cyst, and no scolices (echinococcus heads) on the inner surface of the cyst-wall. Judging from the empty collapsed cyst when floated in water after removal, it would, when tense, have been about as large as a medium-sized walnut. In the specimen now shown the naked-eye appearances of the cyst-wall are fairly characteristic.

Hydatid cysts in the orbit, judging from published records, are sufficiently uncommon to justify the report of

individual cases ; the fact that, as in my case, the nature of the disease has frequently been determined only at the time of operation seems to be an additional reason for bringing forward any case or cases which may assist in the diagnosis and treatment of this disease. Even in countries where the larval form of *Tænia echinococcus* infests man much more commonly than it does in the British Islands, the percentage of orbital hydatids is very low. Cobbold ('Entozoa,' Lond., 1864), in an analysis of 136 cases of hydatid disease, gives one orbital cyst ; and Davaine, in 373 collected cases, mentions nine (?) orbital hydatids.

The cases of hydatid cyst of orbit of which I have been able to find records, including the case now presented, number forty-six. The total would at first sight appear to be larger than this, for Berlin, writing in the Graefe-Saemisch 'Handbuch,' 1880, gave references to thirty-nine cases ; a considerable proportion of these, however, were, as shown by Dieu ('Rec. d'Ophtal.,' 1883), too untrustworthy to be included in statistics.

Three cases have been reported to this Society by Messrs. Mules, Brailey, and Rockliffe,* and several others by former and present members of the Society (Sir Wm. Bowman, Messrs. Hulke, Lawson, and Higgens) in the 'Ophth. Hosp. Reports,' and the 'Transactions' of the Clinical Society.

In a considerable proportion of the recorded cases the cyst appears to be sterile, containing neither daughter cysts nor scolices.† The explanation of this is probably to be found in the conditions under which the cysts grow ; situated in a cavity with bony walls except in front, their increase in size leads at an early stage to so much displacement of the eyeball that surgical interference becomes

* 'Oph. Soc. Trans.,' vols. iii, vii, ix.

† In a table of cases given by Weeks ('Arch. of Ophthal.,' 1889) the term "daughter cyst" is apparently used in a sense which is not in accordance with the writings of helminthologists, and which is, I think, somewhat misleading. Weeks speaks of "one daughter cyst" in several cases where *only one cyst* was present in the orbit.

necessary before the parasite has begun to proliferate. On this point it is interesting to note that Leuckart * says (p. 579), "The formation of echinococcus brood capsules and heads is referred to a later period of growth than is usually the case with the cystic tapeworms. One not infrequently finds echinococci as large as a pigeon's egg, which as yet contain no brood, and others which remain sterile throughout life. The echinococcus bladders grow for fully four months and more before they are capable of proliferation, and have then attained the size of a small walnut. (This is, of course, true only of those worms which develop from the six-hooked embryos; in the daughter bladders, and in those budded off on the outside of the mother cyst, brood-capsules no larger than a hazel-nut are found with heads inside them.)"

"It has been repeatedly observed that in certain localities the echinococci are much more frequently sterile than in others. It is also well known that the presence of heads and hooklets is noted in only a small minority of cases of human echinococci."

Returning now to the clinical consideration of this disease, published cases show that hydatid cysts of the orbit are more common in the young; a considerable proportion of the patients have been children, and in only two of thirty-six examples has the age exceeded forty. The average age of these thirty-six patients was 20·11 years.

The male sex appears to be more prone to this form of disease. Among the forty-six cases to which I have referred there were twenty-five males, fourteen females, and six in which the sex is not mentioned.

The rate of growth of the parasite varies considerably. In a case reported by McGillivray ('Ann. d'Ocul.,' 1866, p. 172) exophthalmos and other symptoms had existed for nearly six years, in Rockliffe's case ('Oph. Soc. Trans.,' vol. ix) for nearly seven years, and in one of Lawson's cases ('Ophthal. Hosp. Rep.,' vol. x) between seven and eight years. In contrast to these we find Weeks's

* Leuckart, 'Parasites of Man,' Eng. edit., 1886.

case ('Arch. of Ophthal.,' 1889), in which only eight days had elapsed from the onset of any symptoms noticed by the patient till operative treatment was adopted.

Except in instances in which suppuration occurs in the cyst, the subjective symptoms and objective signs appear to be mainly, if not wholly, due to the mechanical effect of a tense cyst growing in a limited space, and one in which expansion in any direction except forwards is greatly restricted. A glaucomatous condition of the eyeball, reported in several cases (Pena, Weeks, &c.) is not quite so readily explained, but it may be due to the serious obstruction to the circulation in the eye by pressure on the veins and lymphatics in the orbit and optic nerve. That such obstruction does exist is shown by the intense œdema of the optic papilla, distension of the retinal veins, and retinal hæmorrhages noted in several cases, all of which conditions rapidly disappear after puncture or removal of the cyst.

In Terson's case ('Ann. d'Ocul.,' March, 1893) visual acuity rose from $\frac{1}{20}$ immediately before operation to $\frac{1}{2}$ the next day, and in my own case *rapid* improvement in sight and subsidence of the swelling of the papilla and the venous turgescence followed the removal of the cyst.

Concerning the best method of treatment to be adopted, I cannot say much from personal experience; it probably falls to the lot of few men to operate on many cases of orbital hydatid cysts: a good deal may, however, be learned from study of published cases, and for the information of those who have not yet had occasion to do this I venture to make the following remarks.

Simple puncture except for diagnostic purposes is useless; in all reported cases in which this has been resorted to as a curative measure the cyst has refilled. Other procedures which have been advocated are (1) extirpation of the cyst, complete or partial; (2) incision and the insertion of a drain with the object of exciting suppuration in the cyst, and thus leading to its destruction; (3)

aspiration of the cyst, and the injection into its cavity of a solution of iodine or perchloride of mercury.

1. The first of these methods is that which should be adopted whenever possible. It seems best to cut down upon the tumour, then incise or aspirate the cyst, and remove it entire if possible. After the fluid has been evacuated and the cyst has collapsed, there seems to be but little difficulty in withdrawing the cyst if a sufficiently large aperture has been made in the adventitious capsule.

2. Concerning the second plan of treatment there are no favorable records.

3. The induction of suppuration in a cyst in the orbit is a procedure which has little if anything to commend it, and which not infrequently has been followed by serious results, permanent damage to the optic nerve, and sometimes by severe orbital cellulitis threatening the life of the patient. In one fatal case reported by Bresgen ('Berlin. klin. Wochenschr.,' 1874) suppuration in the cyst had occurred before the patient came under care, and death from meningitis followed. In the only other fatal case recorded (Schmidt, 1801) death took place before any operative measures had been adopted; it was stated to be due to "cerebral venous thrombosis."

It seems fairly established from recorded cases that treatment should be undertaken early; if delayed too long permanent defect or loss of sight is almost certain to ensue from damage to the optic nerve.

(*December* 13*th*, 1894.)

P.S. (July, 1895).—No recurrence of the disease has taken place. An operation for the correction of the divergent squint was undertaken in February, 1895, and revealed the fact that the internal rectus had not been severed, and that its loss of power was due to damage to its nerve, either by the cyst, or during the operation for removal of the cyst.

References to the literature of the subject.

Weeks.—Archives of Ophthal., vol. xviii, 1889, p. 31 : "A Case of Epibulbar Echinococcus, with a Review of the Literature of Echinococcus Cysts in the Orbit." Weeks gives a list of thirty-two cases ; the following references are to a few cases not mentioned by him, and to those reported since 1889.

Hanel.—Jahresbericht der Gesellsch. f. Nat. und Heilkunde, Dresden, 1879, p. 24.

Wecker.—Traité Complet, Wecker and Landolt, vol. iv, p. 835, 1889.

Lawson.—Ophth. Hosp. Reports, vol. x, part 3, 1882.

Barabasheff.—Two cases : (1) Wratsch, No. 1, 1883 ; (2) Petersburg. Med. Woch., p. 56, 1883.

Schmidt.—Centralbl. f. Chir., No. 26, 1885.

De la Pena.—Soc. Franc. d'Ophtal. : "Recueil d'Ophtal.," 1883, p. 113.

Brailey.—Trans. Ophth. Soc. of United Kingdom, vol. vii, p. 118, 1887.

Rockliffe.—Ibid., vol. ix, p. 55, 1889.

Valude.—Annales d'Oculistique, 1889, p. 207.

Sharp.—Brit. Med. Journal, 1890, vol. i, p. 179.

Issekutz.—Wiener med. Presse, No. 12, 1890.

Terson.—Annales d'Oculistique, 1893, vol. cix, p. 161.

Lawford.—Trans. Ophth. Soc. of United Kingdom, vol. xv, 1895 ; Brit. Med. Journal, December 22nd, 1894.

The President recalled that some sixteen years ago he had had an exactly similar case, in which he had operated first of all by an exploratory puncture, which enabled him to ascertain the nature of the tumour. Thereupon he made an incision, and succeeded in removing the cyst entire in the same way as the author had done. On careful examination he found it was a sterile hydatid cyst. The patient was a girl from Shetland, belonging, he believed, to fisher folk ; she had had excellent health. In his own case there was no altered position of the eye

after operation, and he was inclined to attribute the unfortunate result in the author's case to division of some nerve rather than to division of the internal rectus, which could hardly have taken place without the author noticing it. Division of the rectus, too, would not have reduced the movement so much, for it was usually possible to carry the eye after such division beyond the middle line.

Dr. Rockliffe related the case of a man aged thirty-three, who for five years previous to consulting him had suffered from central proptosis with occasional attacks of pain. He refused at first to have anything done, but eventually came back with pain, general chemosis, and increased proptosis. The orbit was punctured, but no fluid escaped, and a week later, on exploring further, he found a hard resisting growth deeply seated in the orbit. As the sight was lost he did not hesitate to excise the eyeball and clear out the orbit, and in doing so he ruptured a suppurating cyst, which, on examination, proved to be hydatid, though it contained neither scolices nor hooklets. The capsule of Tenon was a quarter of an inch thick, and enveloped the tumour. The diagnosis was uncertain before operating, nor did he suppose this ever to be possible until the tumour was exposed or fluid withdrawn. A tumour existing behind the eye with little or no pain, associated with decreasing vision and steadily increasing proptosis, required much thought. It might turn out to be a tumour of the optic nerve. He had a case at present under observation, of an engine-driver, in which there was central increasing proptosis with little or no pain, and as the patient objected to any operative interference at present he was obliged to leave the diagnosis open.

Dr. Johnson Taylor mentioned the case of a child aged three, under the care of Mr. Charles Williams in the Norwich Hospital, in whom proptosis had been coming on with displacement downwards and outwards, the fundus being perfectly normal, there being no optic neuritis. A cyst was diagnosed in the inner and upper part of the

orbit, and, taking into consideration the age of the patient, one naturally thought of meningocele. It was tapped, and the fluid that came away seemed to be applicable to either condition. The cyst refilled, and was again tapped, and on this occasion an analysis of the fluid showed that it was not a meningocele, so it was cut down upon and removed. It was a hydatid cyst containing a large number of daughter cysts.

Mr. LAWFORD said that the differential diagnosis between hydatid cyst of the orbit and meningocele in children was difficult, but the chemical characters of the fluid would always ultimately settle the matter. Puncture with a small hypodermic needle would probably not be harmful in either condition.

IX. INTRA-OCULAR GROWTHS.

1. *Intra-ocular melanotic sarcoma with peculiar characteristics.*

By F. H. Hodges and N. C. Ridley.

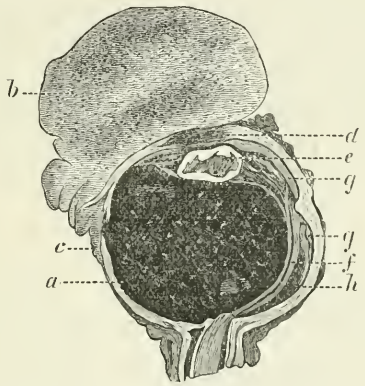
J. B—, æt. 73, labourer. Patient first came to the Leicester Infirmary for treatment on December 4th, 1894. Projecting from between the lids of the right eye was a vascular growth about the size and shape of a filbert. It measured $1\frac{3}{4}$ inches in length, and appeared to be intimately connected with the conjunctiva and the front of the globe, but the upper lid could be retracted. There was a slight discharge, matting the eyelashes together. There was no enlargement of the pre-auricular gland. The eye was at once removed.

History.—In July, 1894, patient first noticed that he had considerable aching pain in his right eye, and saw curious things before his eyes. This lasted for a few days, and there was some photophobia. The pain extended over the right side of the face and forehead. There was a slight discharge. Patient noticed a "bleb" on the ball of the eye. This right eye had been blind for sixteen or eighteen years. Ten days before presenting himself patient noticed that the swelling seemed to grow larger. He thinks the growth took place in about an hour. No history of injury. Has never been under treatment.

Examination of antero-posterior section.—The globe is entirely occupied by a darkly pigmented growth, apparently springing from the choroid, and detaching the retina in front of it. The pigmentation is irregular,

giving rise to a somewhat mottled appearance. At one spot probably corresponding to the exit of one of the venæ vorticosæ the sclerotic has been burst through, its layers being split asunder for some little distance. Extending forwards from this is the large filbert-shaped mass described above. This is not so firm in consistence as the intra-ocular portion, but still much more so than granulation tissue would be. It is pale in colour, but contains one or two slight streaks of pigment here and there.

Fig. 25.



Antero-posterior section of eyeball and tumour.
a. Intra-ocular part of growth. *b.* Extra-ocular part. *c.* Site of perforation of sclera. *d.* Remains of cornea. *e.* Calcareous lens. *f.* Double layer of retina over tumour. *g g.* Blood-clot between choroid and sclera. *h.* Space between retina and pigment layer.

The cornea, which is hidden by the growth, is much shrunken, and hardly to be distinguished.

The lens is displaced forwards, and is calcareous at the periphery. The choroid not involved by the growth is separated here and there from the sclerotic by hæmorrhages. The optic nerve and its sheaths appear to be normal.

On microscopical examination the extra-ocular portion is seen to be a typical round-celled sarcoma with large nuclei; it is very vascular, and contains a few pigment-

cells here and there. The intra-ocular portion presents the ordinary characteristics of a deeply pigmented sarcoma. Bleached sections bear a close resemblance to the extra-ocular part.

Remarks.—The peculiarity of the specimen lies in the difference of pigmentation of the growth inside and outside the globe. It is at present impossible to say what this is due to, but it seems from the history that there may be some connection with the variation in rapidity of growth. We have only been able to find one other specimen of a similar kind, and that is in the Moorfields museum, though a slight difference in pigmentation of the extra- and intra-ocular portions is not uncommon in these sarcomata of the choroid.

The patient has not returned since the operation.

(*Card specimen. January 31st,* 1895.)

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2. *Cystic sarcoma of the ciliary body.*

By C. Devereux Marshall.

H. G—, female æt. 61, was admitted into Moorfields Hospital on February 28th, 1895, under the care of Mr. Silcock, suffering from iritis in the left eye.

Family history.—Patient has had six children; five are still alive and healthy, and a daughter æt. 21 died of consumption. No specific history. Patient is herself in good health, and had no idea that there was anything the matter with the right eye.

On examination of the right eye a rounded tumour was seen apparently growing from the ciliary body on the nasal side. The retinal and choroidal vessels were seen running over its surface.

R.V. = $\frac{6}{6}$, no H.m., Sph. + 4 D. J. 1. Fundus otherwise is healthy.

The eye was excised on March 21st, 1895. It was immediately frozen and opened without hardening, and this accounts for the way in which the retina has become detached, and for the various patches seen on the choroid, which are due to portions of it having become detached.

The growth is situated in the ciliary region. It reaches backwards nearly to the equator. The bulk of the tumour is composed of a large cyst, the anterior part of which is lying against the lens; its inner wall is thin, and the choroid is stretched over it. The most solid part of the growth is in the ciliary region and against the sclerotic; it is very vascular, and contains numerous cystic spaces of variable size.

Microscopically it is seen to be composed of mixed round and spindle cells, containing some pigment scattered irregularly through it, but at some parts, especially just beneath the choroid, this is more abundant.

(*Card specimen. June 13th,* 1895.)

Mr. JOHN GRIFFITH said he had examined about twenty cases of sarcoma of the choroid and three of the ciliary body without ever finding any cystic formation. In a specimen, which he had shown last year, of melanotic epithelial tumour of the retina, however, there were cysts.

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3. *Tubercular growth in eyeball.*

By C. DEVEREUX MARSHALL.

G. R—, æt. 2 years, was first seen in June, 1894. The left eye had been inflamed for six weeks. The globe was injected, the pupil fixed and eccentric. A yellow reflex was seen from the fundus, which was caused by a mass far back in the vitreous. No vessels and no loose masses seen.

Family history.—Patient is the fourth child of a family of five. The eldest died soon after birth, the other three living children are quite healthy. The mother is one of a family of ten, five of whom died of "bronchitis" when young.

The father lost two sisters from consumption, and one brother died aged twenty-four years of hip disease, from which he had suffered since childhood.

Patient was admitted into hospital on February 12th, 1895. The globe was then seen to be filled with a dense white mass. The eye was excised the next day.

The eye was hardened in formol, and an antero-posterior section made.

Section.—The anterior chamber is deep. Pupil completely bound down by posterior synechiæ. The vitreous chamber is occupied by an unpigmented growth, the central portion of which is caseous, and on one side it is very much more broken down than on the other. The more solid part of the growth lies against the sclerotic; it has a firm gelatinous appearance. The iris and ciliary body are pigmented, but there is no pigment seen elsewhere.

Microscopic examination.—Cornea is healthy. Iris is much thickened and infiltrated, and bound down to a mass of growth that encircles the lens. Lens is infiltrated with the growth. The growth is composed of round and irregular cells: the nuclei in many of them stain deeply with logwood; in the more degenerated parts they hardly stain at all. There are numerous giant-cells in the more solid parts of the growth, many of which have large epithelioid cells around them. Sections stained for tubercle bacilli have given a negative result. The growth contains few if any vessels, but near the sclerotic there is a layer containing vessels and a little pigment. This is probably the remains of the choroid. The retina cannot be identified.

The patient is under the care of Mr. Nettleship at Moorfields.

(*Card specimen. March 14th*, 1895.)

4. *? Gummatous growth in the eye.*

By C. Devereux Marshall.

H. H—, male, æt. 2 years and 9 months.

The patient was under the care of Mr. Gunn at Moorfields.

History.—In April, 1894, the mother noticed a "white spot" in the left pupil; this has gradually been increasing in size. He was admitted and the eye was removed on January 22nd, 1895. When ten months old the child had convulsions, and it suffered from "snuffles" during early infancy.

Family history.—The patient is the youngest of a family of five, all of whom are alive. All the children have suffered from snuffles in infancy. The father and mother are healthy. There have been no miscarriages. No history of tubercle.

Pathological report.—The eye was hardened in formol and an antero-posterior section made. Cornea is hazy and the anterior chamber is shallow. The iris is discoloured and bound to the anterior capsule of the lens. The lens is *in situ*, but is somewhat shrunken. The interior of the globe is divided into two parts by the choroid, which is detached. *The outer part* is occupied by a solid growth of irregular outline, and bounded by the sclerotic externally. *The inner part* represents the vitreous chamber. This is contracted to about one third its normal size, and is occupied by a broken-down inflammatory mass which apparently contains the remains of the vitreous in a degenerated state.

Microscopic examination.—The growth is situated between the sclerotic and the choroid. It is composed of numerous small round cells containing scattered pigment granules. Very few well-formed vessels are present. There are some spaces with badly defined walls, which probably represent blood-channels. There is also present

both blood and blood-pigment. The darkly pigmented layer represents the choroid, the pigment of which fades into the adjoining structures. The inner part is divided up into spaces which have contained cholesterine, which has become dissolved in the alcohol used to prepare the specimen. The structure of the inner mass is that of broken-down inflammatory material, which near the margin is invaded by the growth from outside.

(*Card specimen. March 14th*, 1895.)

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5. *Sarcoma of iris.*

By H. Secker Walker.

Ellen G—, æt. 59.

Three years ago cataract extracted from left eye without iridectomy. Lately vision has failed in this eye. There has been no pain nor inflammation. What appeared to be a secondary cataract, slightly pink in colour, filled the pupil. Iris seemed rotten, and was adherent to capsule.

Discission was performed without benefit. The eye became subacutely inflamed, and was excised three weeks later.

The growth fills the whole eye in front of the *fossa patellaris* of the vitreous, and is shaped like a large lens.

The pigment layer of the iris is stretched over its posterior surface, and the growth extends to the cornea in front, obliterating the anterior chamber. The structure is that of a small spindle-celled sarcoma.

(*Card specimen. June 13th*, 1895.)

X. DISEASES OF THE ORBIT.

1. *Plastic cellulitis of orbit.*

By George Lawson.

I have to bring before the Society five cases of orbital cellulitis with fibrinous exudation. In four of the cases there was no pus, and in one a little pus was formed and escaped through one of the exploratory incisions at the close of the case. Of the five cases three died, one had to have the eye removed, and one recovered with impaired sight.

The symptoms were pain in the orbit, œdema of the eyelids, and proptosis coming on shortly after the first symptoms, and increasing impairment of sight. High temperature (from 101° to 107°). The symptoms rapidly increased in severity. The eyelids became purplish red, shining and œdematous, and tightly stretched over the protruding globe. There was pain in the orbit, varying in intensity, and restlessness. If the symptoms were not relieved by treatment the patient became delirious, then comatose and died.

In none of the cases had the patient received any injury, and in none was there any trace of syphilis. In four of the cases the cellulitis was confined to one orbit, and in one there was cellulitis of both orbits. Four of the cases were in women and one in a young man. My impression is that these cases were due to septicæmia, but in three I was unable to ascertain from whence the septic matter came.

In Case 4 the cellulitis of the orbit was preceded by an

acute tonsillitis, and to this was probably due the orbital cellulitis.

In Case 5 the patient was distinctly suffering from pyæmia before the cellulitis of both orbits came on. She had a pyæmic rash on the face, high temperature (103·4°) and pain in all her large joints, but the source from which the pyæmia originated could not be determined. In the female I am certain that septicæmia occurs more often than is suspected from septic materials supplied from the vagino-uterine track—the vagina, uterus, or ovaries; and I have often thought that some of the so-called rheumatisms to which women are so much more prone than men, are really septicæmic, probably induced from this source. In none of the cases was I able to obtain a post-mortem examination. The following are the five cases.

Case 1.—Late one evening, about nine or ten years ago, I was requested to see a girl about twenty-three years of age, who had been ill a few days with pain in orbit and protrusion of left eye. When I saw her there was extreme proptosis of the eye and great œdema of lids. Temp. 107°. The patient was unconscious. I passed a knife into the orbit through the upper eyelid in different directions, but there was no pus. The patient died the same night.

Case 2, a young lad æt. 15, I saw in consultation with Mr. Critchett. There was proptosis of the right eye; great impairment of sight; redness and œdema of lids. An incision was made into the orbit, but there was no pus; and none was afterwards found, although incisions were made in different places around the orbit. The eye was ultimately lost and excised, but the patient recovered.

Case 3 I saw in consultation with Mr. Tweedy. There was proptosis, great loss of sight, so as to be only able to see a moving hand; excessive tension and

purplish redness of the lids with œdema. An incision was made into the orbit both above and below the globe, but no pus was found. Towards the close of the case a little pus escaped through one of the openings. The tension of the lids was so great that Mr. Tweedy divided the external canthus, and also carried an incision vertically upwards from the end of the wound, so as to completely free the upper lid. This patient ultimately recovered, and useful sight was regained, sufficient to be able to read fair-sized type.

Case 4 I saw in consultation with Dr. Williams, of Inverness Terrace. The patient was under his care for a bad throat—tonsillitis. During the treatment she complained of pain in the orbit of the left eye. This was rapidly followed by œdema and a shining dusky redness of the lids, and proptosis of the globe. The symptoms increased, and when I saw her she was unconscious, and with a temperature of 104°. An incision was made into the orbit and the knife moved in different directions, but no pus escaped. She died on the following day.

Case 5.—A nurse in a nursing home, æt. 43. The patient had suffered for many years with extensive mitral disease of the heart. She was under the care of Mr. Stewart, of Harley Street.

On December 16th, 1893, the patient first complained of feeling unwell, and on the following day, the 17th, she was so ill that she took to her bed. Her temperature was then 102°. On the 18th a red rash appeared on her face, and she had pain in all her large joints. Temp. 103·4°. On the 19th she complained of pain in both orbits, and there was œdema of the lids of both eyes, and slight proptosis of left eye.

On the 20th there was proptosis of both eyes and increased œdema of the lids. The sight of both eyes impaired.

On the 21st the proptosis of lids rather increased, and

great impairment of sight. She was in great trouble, as she was afraid she was getting blind, and was frequently trying what she could see. She said she could see the nurse in her room, but she was in a mist. There was no fluctuation to be detected in the orbits with the fingers.

On the 23rd the rash began to fade, and the swelling of the lids was less. On the 24th she was not so well. On the 25th the heart seemed rapidly failing, and she died early in the morning of the 25th.

This patient was without doubt suffering from pyæmia, but it was impossible to ascertain the source of the poison.

(*December* 13*th*, 1894.)

Mr. Hulke said he was exceedingly interested in the subject of Mr. Lawson's paper. All of them must at one time or another have seen such cases. It was to be regretted that in the cases recorded by Mr. Lawson no necropsy had been obtained. It is open to question whether the orbital cellulitis, in presence of a general septicæmia, was primary, or whether it was not consequent upon a thrombosis of the ophthalmic veins and cavernous sinus—a view supported by the presence of great cerebral disturbance suggesting meningitis. One of the first cases he had seen was that of a lady who had had her breast removed by Sir W. Bowman. She went on well for a few days, when symptoms of pyæmia supervened followed by cellulitis of both orbits, and she soon died. There were distinct ante-mortem thrombi in the cavernous sinus and ophthalmic vein, and also in the veins of the choroid, with hæmorrhage. Of such cases the majority probably die, but there are other cases of a less severe type, cases where one could speak confidently as to the absence of pyæmia; one could not as certainly exclude septicæmia. He had seen two examples of this latter class coming on as the sequel of influenza in the late epidemic, and they all recovered. Some years ago he had seen another case of this kind, also occurring as a

sequel of influenza. He had also observed its occurrence once after measles.

Mr. TWEEDY observed that, as the author had intimated, these cases are always very grave ; in the particular case which they had seen together in consultation the lady was so ill that they told the husband that there was little hope of her recovery. The history of the case was as follows :—It occurred seven years ago, and two years previously the patient had had some lachrymal obstruction, for the relief of which he had opened the canaliculus and passed a small probe. He saw nothing more of the patient until December, 1887, when he was called to her again. She had been very ill for three or four days in bed. The right eyelids were dusky red, enormously swollen, and brawny, and the eyeball was prominent ; there was high temperature, and the patient was semi-unconscious. He made several incisions, but without escape of pus. There was bare perception of light. Two days later, as the patient was worse, Mr. Lawson saw the case in consultation, and another exploratory incision was made, but without finding pus. He freely divided vertically the whole of the upper lid near the outer canthus. This he thought was very important, and indeed he ascribed recovery to it. The eyelids gaped and the eyeball protruded, and there was immediate relief to the pain, and from that moment both local and constitutional symptoms steadily subsided. The eyeball itself was very much inflamed, there was hypopyon-keratitis, and at a later stage much ulceration between the lids and the globe, so that symblepharon occurred. The adhesions were broken down, and their re-formation prevented by fine rubber sheeting placed between the lids and globe. The patient ultimately made a good recovery, and when last seen in September, 1888, the vision of the right eye was $\frac{20}{30}$ and No. 1 Jaeger, though there was some pallor of the disc and contraction of the field of vision. Three years ago he had another such case, though not of the same degree of severity, which recovered perfectly.

Mr. Lawson had remarked on the absence of any injury in these cases. He himself could scarcely take this view ; indeed, he was inclined to think the cellulitis was probably due to disease or injury of the orbital walls. In the particular case mentioned by Mr. Lawson there was a history of some very fine stricture in the lachrymal sac and nasal duct, and in the second case referred to the cellulitis came on about a week after cauterisation of the nasal mucous membrane. His personal experience had led him to believe there was a possible danger to the eye and orbital contents attending the surgical operations in the nasal cavity.

Mr. Anderson Critchett said he was unable to give any additional information in respect to the particular case in which he had seen the patient in consultation with the author. He remembered giving a grave prognosis, and was very much relieved when he found that a fatal result had been averted. In a case recorded by him some years ago the affection was attributed to some undescended molars. These were removed, and the patient made a good recovery. The third case was one in his father's practice, the patient being a young lady staying in an hotel at Sydenham. Free incisions had been made into the orbit, but no pus escaped. The temperature rose to 106° F., and she died on the following day. Shortly before this occurred his father had freely divided the lid in a case of gonorrhœal ophthalmia, which had enabled him to wash out the sulcus very thoroughly, and the eye was saved in spite of the fact that the case was one of great virulence. His father had expressed great regret that he had not resorted to free division of the lid in the case of this young lady.

Dr. Adolph Bronner mentioned that several cases had been recorded after operations on the nose. He remembered one such case in which a man with nasal polypi and purulent discharge was struck on the nose, with subsequent pus formation. It had been known to follow cauterisation of the nose.

2. *Pulsating tumour of orbit.*

By Bowater Vernon.

This case was under Mr. Hulke, 'Ophthal. Soc. Trans.,' vol. viii, p. 52.

(*Card specimen. March 14th,* 1895.)

The President said that on a previous occasion he had pointed out in connection with these cases that the application of galvano-puncture induced coagulation within the sac, and this he thought would be the best treatment. Judging from two cases of traumatic origin under his care, in both of which a complete cure had resulted, he would be inclined to give a trial to this plan in spite of the fact that it had failed so far. He suggested that possibly the little coagulation that might have been produced by previous galvanic puncture was not sufficient to affect the blood-current. The operation required to be repeated in some cases on several occasions, and it was not attended with any risk.

Mr. Henry Power said he had had a somewhat similar case in which an injury was inflicted by a bullet at the inner side of the orbit, and a tumour formed which proved to be an aneurism. In that case the left carotid artery was tied, and if the growth had recurred he was quite prepared to tie the artery on the other side. At the same time he thought the President's suggestion was reasonable.

Mr. Higgens said that he too had seen a case of the kind consequent on an injury to the inner side of the eye. The symptoms were the same as in this case, though less pronounced. That case was treated by cutting down upon the most prominent part of the swelling and tying all the vessels leading to it. He expressed surprise at being told that the carotid on the same side had been ligatured, for there seemed to be free pulsation along its course.

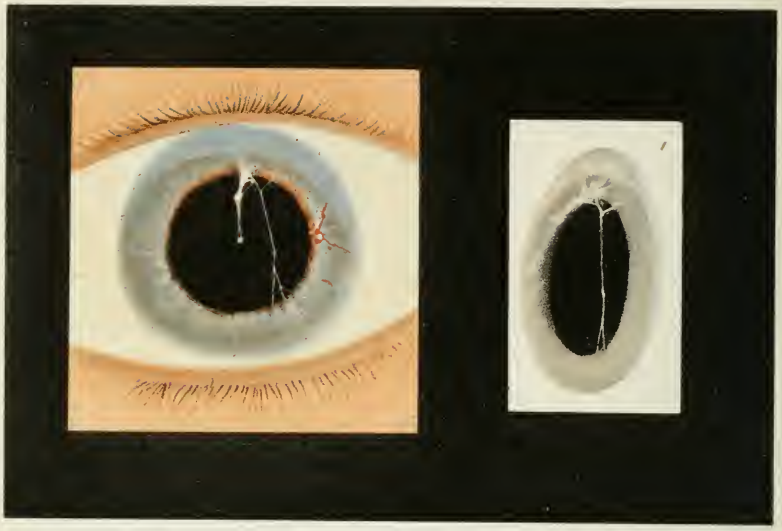
XI. CONGENITAL ABNORMALITIES.

1. *Polycoria, with deep pitting of the optic disc.*

By E. Treacher Collins.

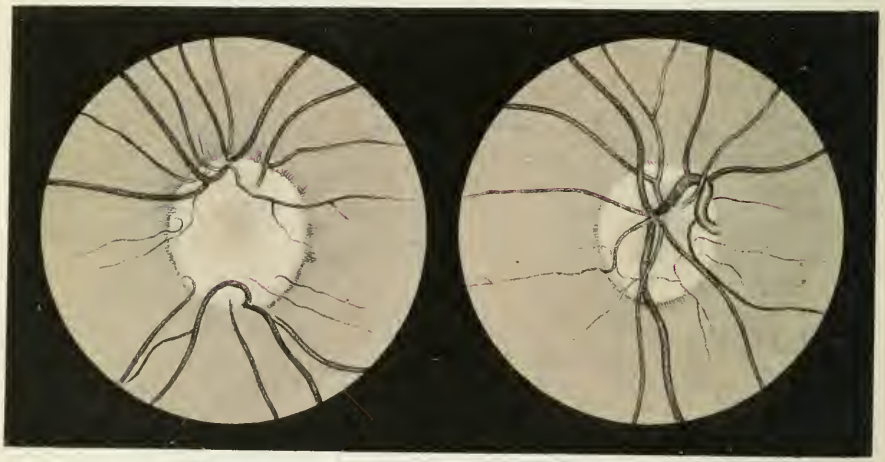
Frank S—, æt. 9, came as an out-patient to the Moorfields Hospital under Mr. Tay on October 25th, 1894. His mother stated that she noticed nothing the matter with the boy's eye when he was born. When fourteen days old he had chicken-pox (? smallpox) ; he was ill for six weeks, during the greater part of which time his eyes were closed, but there was no discharge, and he had no inflammation in them. On his recovery from the illness his mother first observed a defect in his left eye. It has remained much the same ever since, except that she thinks the black part has somewhat increased in size. She is quite sure he has never had any operation performed on the eye. The patient is the third of a family of seven ; neither of his parents, or any of his brothers and sisters, have any malformations of their eyes or any other part of their body.

Present condition.—Left eye : the cornea is clear and the anterior chamber of normal depth. There are two openings in the blue iris, separated by a band of tissue about 1 mm. in width. The outer one appears to be the normal pupil, for the small corona of the iris can be traced around part of its circumference. It is displaced outwards, and its outer margin is prolonged to a point. A little uveal pigment shows at its lower border. The inner opening is triangular, two of its sides are longer than the third, the short one or base is at the inner



A.W Head, de.

Fig 1.



M[illegible] H Brooke [illegible]

Fig 2.

Bemrose & Sons chromo lith

DESCRIPTION OF PLATE VIII.

Fig. 1 illustrates Mr. A. Quarry Silcock's case of Anterior Synechia of Congenital Pupiliary Membrane (p. 193).

Fig. 2 illustrates Mr. J. B. Lawford's case of Unusual Arrangement of Retinal Vessels (p. 195).

margin of the cornea; no iris is present there; the point of the triangle is directed towards the inner margin of the outer opening. Running parallel with and close to its upper margin, on the surface of the iris, a blood-vessel is seen. Both openings become enlarged on the application of atropine. There are two small white patches on or beneath the anterior capsule of the lens, and a delicate tag of white membrane which is apparently attached to the iris.

Ophthalmoscopic examination.—There is deep cupping of the optic disc; the edge of the cup does not extend quite up to the margin of the disc, though it is very close to it at the lower and outer part. The retinal vessels are much bent, and disappear from view where they turn over the edge of the cup.

T. n. Vision = $\frac{6}{6}$, Hm. 1·5 $\frac{6}{6}$.

Right eye.—The cornea is clear, and anterior chamber of normal depth. There is some irregularity of the upper margin of the pupil; instead of presenting its normal curve it is prolonged slightly upwards into a point, and a tag of white membrane is seen passing from the iris to the lens capsule.

Ophthalmoscopic examination.—There is some cupping of the optic nerve, but the cup has sloping margins and is confined to the central portion of the disc.

(*Card specimen. November 8th*, 1894.)

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2. *Anterior synechia of pupillary membrane (congenital).*

By A. Quarry Silcock.

(With Plate VIII, fig. 1.)

Henry M—, æt. 21 years.

Both eyes are somewhat small and not well developed. The left cornea is very small. There is infiltration round

the margins of both corneæ, but the patient never remembers having inflammation of the eyes.

R. V. = $\frac{6}{9}$; J. 1. L. V. = $\frac{6}{9}$; J. 1. Both eyes are hypermetropic.

In the left eye the upper portion of the pupillary membrane can be seen to extend forwards from the front of the iris to the back of the cornea. The condition is well represented in the water-colour drawing.

(*Card specimen. June 13th,* 1895.)

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3. *Congenital pigmentation of retina.*

By H. Work Dodd.

(With Plate IX, fig. 1.)

R. T—, a clerk, æt. 58 years.

Left eye, *nil.*

Right eye, vision normal; refraction + 2·50 D. There are several spots of black pigment running upwards and inwards from the disc, possessing many of the characteristics described by Dr. Sydney Stephenson in his paper on "Peculiar Retinal Pigmentation" ('Ophthalmological Society's Transactions,' vol. xi, p. 77). Beyond these spots in the retina there are absolutely no abnormal signs.

(*Card specimen. June 13th,* 1895.)

DESCRIPTION OF PLATE IX.

Fig. 1 illustrates Mr. Work Dodd's case of Congenital Pigmentation of Retina (p. 194).

Fig. 2 illustrates Mr. Kenneth Campbell's case of Horizontal Equatorial Rupture of Choroid (p. 126).

A.W Head.

Fig. 1.

N C Ridley

Fig. 2

Mintern Bros. Chromo lith.

4. *Unusual arrangement of retinal vessels.*

By J. B. Lawford.

(With Plate VIII, fig. 2.)

Drawings of fundus oculi (right and left) of a female child æt. 10.

R. eye.—An anomalous vein of large size is shown on the optic disc, continuous at the centre of the papilla with the vena centralis retinæ, and ending abruptly at the nasal edge of the disc.

L. eye.—All the retinal vessels emerge from the optic disc at its margins. The central part, which is dark grey in colour, is entirely devoid of large vessels.

The eyes are in other respects normal. Refraction hypermetropic in each, 5 D. Vision with correction $= \frac{6}{6}$.

The child is healthy and well developed. She had six digits on each hand at birth.

(*Card specimen. January 31st,* 1895.)

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5. *Microphthalmos and persistent hyaloid artery.*

By A. Stanford Morton.

Arthur B— has left microphthalmos. At the back of the lens in the lower and outer quadrant is a well-defined membrane, with a few fine vessels ramifying in it. Reaching backwards from this is a funnel-shaped sheath of membrane, which is attached around the margin of the optic disc. On this membranous sheath are seen some vessels which diminish in size as they reach the attachment of the membrane to the disc, where they pass only a very short distance on to the retina. Some of the vessels pass forwards to the back of the lens. Inde-

pendently of these, other vessels are seen to issue from beneath the lower edge of the sheath, and to traverse the retina in the usual way.

(*Card specimen. May 2nd*, 1895.)

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6. *Double anterior polar cataract associated with persistent pupillary membrane.*

By A. Quarry Silcock.

F. W—, æt. 20, married. Patient has complained of bad sight all her life, and her friends have noticed spots in front of her eyes. There is no history of a similar affection in any other member of the family.

On examination there is a faint nebula on each cornea in a somewhat downward and inward direction. There is a circular elevation, about 1 mm. in diameter, situated at the centre of the anterior surface of each lens. These elevations are of a white colour, with a few specks of pigment on the surface. They look like small balls of cotton wool slightly blood-stained on the surface. From each elevation a number of fine bands stretch over the margin of the pupil, being attached peripherally to the anterior surface of the iris at a little distance from the pupillary margin. They extend in both eyes in a direction downwards and inwards, some of them being branched and continuous with those adjoining. Behind the right central spot is a second thin layer of opacity, separated by clear lens substance from the portion in front. The strands are loose when the pupil is in its normal condition, but are stretched tightly on dilatation with a mydriatic. R. V. $= \frac{4}{60}$, J. 4; L. V. $= \frac{4}{60}$, J. 4. T. n.

This condition seems to be due to two defects of development:

1. Delay in formation of the anterior chamber and

increased proliferation and mal-development of the anterior layer of lens cells from pressure.

2. Persistence of pupillary membrane in part.

The haze of the cornea is probably congenital also, and may be due to the pressure of the lens.

Patient has one lateral incisor in the upper jaw that is slightly pegged and notched, but there is no other evidence of congenital syphilis.

(The notes of this case were taken by Mr. C. D. Marshall, F.R.C.S.)

(*Card specimen. January* 31*st*, 1895.)

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7. *Peculiar* coloured *lenticular opacities; probably congenital.*

By J. B. Lawford.

Frederick S—, æt. 32.

R. $\frac{6}{6}$. } No complaint of defect of sight.
L. $\frac{6}{6}$. }

In the anterior cortical layers of each lens, in the axial part, is a rosette-shaped collection of fine closely-set dots, which, on illumination by focal light, are very distinctly *green* in colour. By transmitted light (when examined with the ophthalmoscopic mirror) they are scarcely visible, and have no appreciable colour. Fundus in each eye normal. No history of disease of eyes.

Patient came to hospital in consequence of a slight injury to his left eye.

(*Card specimen. June* 13*th*, 1895.)

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8. *Pulsating exophthalmos (congenital).*

By Ernest Clarke.

This patient is a boy æt. 4 years, and was shown to the Society a year ago (see 'Transactions,' vol. xiv, p. 202). Since then the aneurism has been treated by electrolysis by Dr. Lewis Jones (Electrician to St. Bartholomew's Hospital). Five sittings have been given at intervals of about six weeks; five or six curved platinum needles with insulated shanks, and connected with the negative pole, were passed in between the upper lid and eye to the back of the orbit, and a current of 20—30 milliampères was used, and the time of the sitting varied from five to ten minutes.

Result.—Proptosis has been considerably reduced, and the pulsation is much less. Each application caused a good deal of conjunctivitis, but no constitutional disturbance.

(*Card specimen. January* 31*st*, 1895.)

XII. MISCELLANEOUS.

1. *Eyesight and the public services.*

By George Mackay.

The object of this communication, which shall be as brief as I can make it, is to express an acknowledgment and to elicit an opinion.

The acknowledgment which I wish to make is that the recognition of the importance of good eyesight in the public services of this Empire is largely due to the action of members of this Society.

The opinion I would elicit is whether the visual examinations are conducted in a satisfactory manner.

In 1863, to satisfy the requirements of the War Office "that men should not be received into the service who did not see well, to 600 yards at least, a black 3-foot target centred on a white ground," Prof. Longmore, of Netley, devised the now familiar army dot test-card,—black $\frac{1}{5}$-inch squares being exposed on a white surface at 10 feet. To pass this test requires one fourth of normal vision (or $\frac{6}{24}$ Snellen). If exposed at 15 feet it corresponds to one third of normal vision.

In 1875 Mr. N. C. Macnamara opened communications with Prof. Longmore, with a view to determining the standards of vision which should be required of candidates for Government employ; but it was not until 1886 that a committee* of members of this Society, with Mr. Macnamara as chairman, drew up the existing rules as to the standard of vision required for candidates for commissions in the army and other services. At the suggestion of Sir Joseph Fayrer (the late Medical Adviser to the

* The following gentlemen composed this Committee:—Messrs. Macnamara, J. Couper, G. Lawson, Power, Nettleship, Tweedy, and G. A. Critchett.

India Board), and through his influence, these standards were accepted by the Government of India, and subsequently by the War Office.

I trust that I am only giving credit where it is due when I say that the chief burden of publishing this code fell upon Mr. Macnamara, but the modesty which led him to request Sir Jos. Fayrer to place his name upon the title-page of the little pamphlet issued in 1886* by J. and A. Churchill is so characteristic of all the other members of the committee that the true history of the adoption of these visual standards has been somewhat obscured.

For my part I desire to express my obligations to these gentlemen for having supplied an indispensable "vade-mecum" to their ophthalmic brethren, and a most valuable 'Guide to Occupation' for many of the intelligent and educated youth of this country.

Turning now from past history to present facts, we find that a great distinction exists between the method of fixing a standard recommended by our colleagues of this Society, and that generally regarded as sufficient by laymen, or by our medical brethren who are not constantly engaged in ophthalmic practice. The chief difference is this: the one includes an estimation of the refraction of the eye; the other depends simply on the acuteness of form vision.

In most of the public services for which these standards have been fixed the wearing of glasses is permitted, a direct inducement to estimate the refraction is offered, and a large number of the applicants, being well-to-do, seek skilled advice before making up their minds to attempt the literary examination. Plainly it is our duty, so far as we can, to warn all those with latent errors (especially if in excess of the ametropic allowance) that the day will come when without glasses their vision will fall below the standard, and that they may have difficulty in continuing

* 'Regulations as to Defects of Vision which Disqualify Candidates for Admission into the Civil or Military Government Services,' by J. Fayrer, K.C.S.I., LL.D., M.D., F.R.S. London: J. & A. Churchill.

their duty. They may not believe us, and perhaps time alone will convince them. But under existing circumstances a large number of young men in this country are admitted to various services simply in response to a form vision test, it may be of type or of dots. The refraction is not estimated. It is thought to be too difficult or too tedious for those in charge of the testing arrangements. It is too difficult for laymen and untrained medical men, but there are plenty of surgeons all over the country competent for the duty.

An examination which includes an estimate of the refraction not only determines that the present acuteness is sufficient, but affords the best guarantee of probable future fitness. Its inclusion appears to me to be an indispensable safeguard against the blasting of careers from visual failure. As hon. sec. of the British Medical Association's Committee for Promoting the Efficient Control of Railway Servants' and Mariners' Eyesight my attention has been specially drawn to this subject. But it is not alone the railway managers nor the Board of Trade who trust to form vision tests and neglect the weightier study of refraction. The admission of cadets and recruits to the army and navy has afforded many object lessons in the fallacy of which I speak. I have little doubt that the experience of members of this Society will supply numerous illustrations. I am certain that the present neglect of refraction in estimating visual capacity is costly to the employer (whether the State, the company, or the capitalist), and the cause of hardship to the employed.

I wish to elicit the opinion of this Society as to whether we ought not to make this as widely known as possible. Obviously the condemnation of visual examinations for the public services which do not include an estimate of refraction involves the exclusion of lay examiners from the duty of determining visual fitness. That appears to me highly desirable in the best interests of the candidates for employment. I seize the present opportunity of

bringing this subject forward because the regrettable appointment of lay examiners of vision by the Marine Department of the Board of Trade, and their general employment on the railways of this country, is to be made one of the subjects of representation by a deputation of ophthalmic surgeons which is to wait upon the President of the Board of Trade (Mr. Bryce, M.P.) at Whitehall to-morrow. The deputation has been organised by the committee of the British Medical Association already mentioned. I shall not detain you with the history of this movement, but as several leading members of this Society have consented to accompany the deputies the occasion appears opportune for inviting the general body of members to give expression to their opinions on the subject.

(*January* 31*st*, 1895.)

Fleet-Surgeon Preston said he had had many years' experience of officers as well as men in this respect. The official tests were divided into two classes, first those for the executive—the fighting element, from whom was required full normal vision as tested by Snellen's types; secondly, the civil element, medical officers, chaplains, paymasters, &c., from whom full normal vision was not required. Engineers, like the executive, were required to possess full normal vision. There seemed to be some difference of opinion between the medical department and specialists. What the latter called full normal vision was not considered to be such by the former. For instance, in the line, D = 50, they required that every one of the letters should be read at the proper distance. He had known candidates bring certificates from ophthalmic surgeons that they had full normal vision when they have only been able to read three or four letters of this line. These boys had some hypermetropia with astigmatism, and had to be rejected. It was absolutely essential that all officers should have perfect vision at all periods of their official lives. One gentleman

had remarked that the colour testing was not perfectly adequate. When he himself had given evidence before the Royal Society Commission a note was made in the report to the effect that this examination was an adequate one. Not only had they used coloured bunting and coloured wools, but also the marine telechrome introduced by St. Clair Buxton, by which they tested the colour vision with various coloured glasses,—in fact, no step was left untaken to enable them to be quite certain that no degree of colour-blindness was present in any executive or engineer officer. One of the speakers had mentioned a case in which a young cadet who was rejected at one examination was subsequently passed as fit. He remembered the case well, but it was about one in two thousand examinations. (Mr. McHardy said he could furnish other instances.) It was necessary to take one fact into consideration. There were a lot of candidates, 250 or more, to be examined in a certain place and time, and they had to pick out those who had perfectly normal vision. One could not say to a rejected candidate "Come up again," because such candidate was just as likely to have the particular defect some time later when he was in a ship. A settled test was absolutely indispensable, no matter what time of day, no matter what light, and the standard could not be deviated from. It was only through the courtesy of the examining board that candidates were allowed to present themselves again. With regard to examining the refraction, he was prepared to admit that was desirable, but to do it would mean the employment of a specialist, which meant expense, and if more money were asked for the Treasury would say no. No doubt it was a great hardship with regard to the engineers. These young candidates were not examined until they had succeeded at the competitive examination, and he thought this might well be made a grievance, for it often happened that those who took the highest places in the examination had the worse defects of vision, with resulting rejection for the service.

Mr. Priestley Smith was interested by the information given by Fleet-Surgeon Preston. The issue of printed regulations as to defects of vision which disqualify for the Government services had been a great convenience to ophthalmic surgeons, but it now appeared that in practice those regulations were not strictly adhered to. If, as Mr. Doyne alleged, candidates whose vision was below the prescribed standard were admitted notwithstanding, and candidates whose vision was well up to it were sometimes rejected, the regulations were of little use. By normal vision ophthalmologists understood $\frac{6}{6}$ (Snellen) in a good light; a bad light lowered the acuteness. But Fleet-Surgeon Preston said they required this standard in any light. Discrepancies must arise in this way, but there was a more important point. The pamphlet said that every candidate for the navy must be emmetropic. It now appeared that the examiners were satisfied with normally acute vision irrespective of refraction. If moderate hypermetropia was no disqualification the printed rule ought to be altered.

Mr. Critchett said he merely wished to endorse the statement in one particular, viz. in reference to a bright light falling on the test types. He took it that the use of a bright light was the only fair method. He referred to the case of a candidate for the army. This candidate had been assured by himself that he would undoubtedly pass, and the same opinion had been given subsequently by Mr. Macnamara and Mr. Lawson. The candidate, however, was rejected, and naturally enough they were rather nettled at this. They met and tested the candidate's vision together, and went very carefully into the question of his examination by the War Office authorities, and they found that he had been tested at 3.30 on a dull November afternoon without any artificial light. Thereupon they had taken steps to bring the matter to the notice of the authorities, and when the case came before the Commander-in-Chief he had decided to admit the candidate. This showed that if one were

disposed to fight the question and bring it before the highest authorities they would find that the pamphlet would be upheld.

Mr. Doyne said that according to his experience, except in regard to the naval service, Sir J. Fayrer's guide was of no value whatever. In itself it was excellent, but he affirmed absolutely that in respect of the army, the Indian Civil Service, &c., it was utterly valueless as a guide. To his knowledge case after case of men having double the permissible amount of myopia had passed, although he in some cases had confidently affirmed that they could not pass. He knew at this moment a man who had between 4 and 5 D. of myopia in both eyes, yet he was passed into the Civil Service. This man had had just now gonorrhœal ophthalmia followed by perforation of the cornea and loss of vision in one eye, which was much altered by astigmatism; yet he ventured to say that he would still be passed when he went up again before going out to India. He would take this as a test case. Instead of blasting men's careers by refusing them, the ophthalmologists blasted their careers by telling them that they ought not to go up. The naval examination was the only one that was seriously conducted. He said he would be pleased to furnish names and figures. He urged that it was very important the standard should be adhered to, but it was also important to know that this was not at present the case. He referred to the case of a man with myopia 6·5 D.; he got less than $\frac{6}{9}$ with either eye, and also had internal strabismus in the left. He told him he had no chance of getting in, but the tutor was very anxious he should go up. The superior authority wrote across the letter in red ink to the effect that the actual testing rests with the medical officers appointed for that purpose, but under the circumstances if there was no active disease going on the candidate would not necessarily be rejected.

Mr. Bickerton asked when these very rigid rules came into existence. (Answer: in 1864.) He was not refer-

ring to the date of the drawing up of the regulations, but to their rigid enforcement. (Answer: in 1864.) He called this statement in question. He knew men who had passed the test, and who had remained in the service for a long time. He would only call attention to one case, but it was an historical one. Possibly Fleet-Surgeon Preston knew of it. He referred to the loss of H.M.S. "Vanguard" in the Irish Channel on September 1st, 1875. The particulars of that disaster were briefly these. Four men-of-war ("Warrior," "Hector," "Vanguard," and "Iron Duke") weighed anchor at Kingstown Harbour for Cork. Shortly after sailing the vessels ran into a bank of fog. Whilst in this fog the speed of the "Vanguard" was reduced while that of the "Iron Duke" was maintained, and the not unnatural sequel of the one running into the other occurred, seventy minutes sufficing to send upwards of a quarter of a million of money to the bottom. The court-martial on the loss extended over nineteen days; the evidence was minute, and the court came to the conclusion that the loss of the ship was due to six causes, which, however, it is scarcely necessary to mention here. In addition six officers were reprimanded, two of them being dismissed their ship. That four of these causes had practically nothing to do with the disaster will be seen by the fact that the Lords of the Admiralty, in commenting on these six said causes, cut them down to two, namely, (*a*) to the reduction of speed of the "Vanguard," and (*b*) to the sheering out of line and quitting station by H.M.S. "Iron Duke." No one will question the statement that, however much the "Iron Duke" had sheered out of line, the collision could not have occurred but for the reduction of speed on the part of the "Vanguard." But the slowing of the "Vanguard" was not the initial cause of the accident; it was in itself but the effect of a cause, and we must inquire what it was that led to the slowing, for in that lies the real cause of the disaster. On that point the evidence is very definite; we find that the slowing of the vessel was a direct consequence of a report

by a "look-out" man that a ship was crossing the bows of the ironclad, and it was to avoid running this ship down that the captain gave the order to slow. And when we find that this "look-out" man had defective vision, that in evidence he stated that his sight was "not good on all occasions," that he had "on two or three occasions been treated for defective eyesight," and that "the sight of his left eye was a good deal stronger than that of his right;" when we find that of five "look-out" men, placed equally well for seeing, this man alone saw the ship; and when again we find Mr. Hunt, First Lord of the Admiralty, stating from his seat in Parliament that "indeed the vessel seemed to be the veritable phantom ship," and again that "from the evidence there could be no such ship," are we not justified in coming to the opinion that the ship ahead was indeed but a phantom of this "look-out" man's disordered vision, and that in his defective vision lay the true cause of the accident?

I fail to see how a case better proving the correctness of our contention, that defective eyesight in sailors is sufficient to, and does, lead to accident, could be found. And if further corroboration of this case is required, it may be found in a quotation from the parliamentary report of a speech delivered on this disaster by Lord Brassey, which reads as follows:—"It turned out that this seaman had been twice treated for blindness in the right eye, which was the organ directed to the supposed ship."

A friend of his, a naval doctor, had told him that, as far as he was concerned, the navy colour-test consisted simply in asking the candidate to name little coloured flags, and he said that it was not any better than the test of the Board of Trade. He mentioned this because, though he had no doubt that the standard of test which was wanted in the navy was good, and that the officers did their best, he was equally sure that when it was said, as the Royal Society had said, that the actual testing was about perfect, it was saying too much. He could not help expressing the opinion that the appalling disaster to the

"Elbe" yesterday could not have occurred at a more opportune time, for if, owing to it, public opinion was more closely directed to the aims of the deputation which was going before the Board of Trade on the following day, instead of hundreds, thousands of lives would be saved, if only the Board would cause accurate and careful tests to be applied to sailors at the threshold of their careers instead of, as now, after many years' service.

Dr. Stephen Mackenzie observed that perhaps nothing better illustrated the continuity and progress of knowledge than the discussion that had taken place that evening. In 1886 the Society had constituted a committee which interviewed the authorities, and had been productive of great good. It was now proposed that the Society should continue its action, and the Society could with greater force and weight than any other body advise the authorities that the progress of their knowledge now necessitated more stringent tests at the present time than were advised in 1886. He was pleased that the motion he was about to propose would be seconded by Mr. Juler, who was much more competent than he was himself to do justice to the technical aspects of the question. He himself had been asked to propose the motion, not as an expert on the refraction of the eye, but as a member of the general medical profession, which, as the discussion had shown, were interested in the matter. The progress of knowledge rendered it easier for them at present to urge upon the authorities the necessity for more thorough tests than had been urged years ago. He thought it was most encouraging to find the very earnest spirit that actuated the Admiralty.

While they might not always succeed in detecting errors which it was desirable should be recognised, they were very anxious that the executive, putting aside chaplains and doctors, who apparently might be blind without detriment to the service, should be above suspicion, in the matter of eyesight. He did not think they would share Mr. Doyne's experience as to the

responsibility that attached to ophthalmic surgeons in blasting the careers of enterprising young men. They would take a wider view, and regard the safety and prosperity of the whole nation, not the success of a few men. They and all were interested in ensuring that the services should be well supplied with the best men. No time could possibly be more opportune than the present in view of the recent sad calamity of the "Elbe." One could not say at present how far it was dependent upon some defect of vision in the look-out. The very fact that such calamities occurred at sea made it necessary that every means should be taken to obviate the causes that led to their occurrence in the future. Of course it was recognised that if the resolution were adopted, it would lead to the employment of experts in ophthalmological practice. He had no doubt, from Fleet-Surgeon Preston's remarks, that the Royal Navy would rise to the occasion, and would provide the requisite talent from within its own service for the proper examination of candidates; but whether all the services could do this, or whether, in spite of the restrictions of the Treasury, they would be obliged to call in outside aid, it was most advisable that the refraction should be tested in all cases. He had no doubt that the deputation from the British Medical Association would be greatly strengthened by a deputation from the Society. The deputation would speak with the highest authority of any body of persons in the country. He concluded by moving—"That in the opinion of this Society no examination of eyesight is fair or satisfactory which depends merely upon the examination of the form-vision by test types and dots, and omits an estimation of the refraction." Further—"That the Society appoints the President, Mr. Henry Power, Mr. Nettleship, Mr. Lawson, Mr. Couper, Dr. Brailey, and Mr. Hartridge to accompany the deputation of the British Medical Association to give expression to the foregoing resolution."

Mr. Juler seconded the resolution, and on being submitted to the meeting it was carried unanimously.

Mr. Mackay, in reply, said he was glad to find that he had secured his object, which was to bring the matter prominently before the Society, and obtain an expression of opinion. A great responsibility rested with them to let it be quite distinctly known that the refraction, in addition to the estimation of vision, was a fundamental element in determining the fitness of an eye for future work. He was glad to feel that those who were going with the deputation on the morrow might take up a very emphatic position in earnestly bidding Mr. Bryce to decide that the examinations under the Board of Trade shall be put upon a thoroughly satisfactory basis. So long as lay examiners or medical examiners were employed who fought shy of testing errors of refraction, he felt sure injustice would be done.

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2. *Ophthalmia nodosa.*

By J. B. Lawford.

In presenting a communication to the Society on this subject I propose to read notes of a case which has been under my care, and which forms the text of my paper, and afterwards to place before you, to the best of my ability, a word-picture of the disease in its clinical aspects. Subsequently, if time permits, I shall endeavour to discuss briefly some of the many knotty points in the pathology and pathogenesis of this peculiar and little-known affection.

Notes of case.—W. H. C—, æt. 16, a schoolboy, came to see me on September 27th, 1894. Two weeks previously, while in the country (South Wales), a caterpillar had been thrown at him by a playmate, and had struck his right eye. He picked up the caterpillar and examined it, and subsequently the skin of his hand became irritable and slightly sore, and a number of small white spots

appeared. These and the smarting and itching soon disappeared.

The right eye became at once painful and photophobic, and soon afterwards congested. The inflammatory symptoms continued and increased, except the pain, which disappeared in a few days. The lad was seen by a medical man, who advised that the eye should be protected by dark goggles, and gave a lotion for local application.

September 27th.—Right eye: slight œdema of lids; severe photophobia and much lacrimation on exposure of the eye to light. General congestion. Cornea not well seen on account of photophobia. Pupil contracted but circular. Upper lid could not be everted. No foreign body detected in lower cul-de-sac. No conjunctival discharge. No pain except on exposure. Ordered Ung. Atropinæ et Cocainæ 1 per cent. t. d. to R. Right eye to be well shaded. Left eye normal.

29th.—Right pupil well dilated and circular. Congestion much less, but eye still very photophobic. Cornea clear. On eversion of upper lid, beyond some congestion of palpebral conjunctiva, nothing abnormal was detected. Lower palpebral conjunctiva much congested, thickened, and with a somewhat granular surface. A few pale papular elevations visible in the conjunctiva. Ointment continued. Ordered Gutt. Zinci Chloridi et Cocainæ Hydrochlor. to right.

October 2nd.—Right improving; photophobia and spasm less, examination much more easy. Cornea clear. Iris looks fairly healthy. No synechiæ; no nodules. In lower palpebral conjunctiva three (? more) minute black points can be seen with a magnifying lens. Two of these are in the papular elevations previously mentioned.

4th.—Right quieter. Ocular congestion much diminished. Lower palpebral conjunctiva still thickened, especially in retro-tarsal part. It is slightly œdematous, and shows soft smooth elevations in addition to the whitish papules before described. Two hairs removed from conjunctiva of lower lid; their ends could be seen with the aid of a lens, and they were easily displaced by a needle

and picked up with forceps; no others could be found. Although thickened the conjunctiva was not very vascular, *i.e.* it did not bleed very readily when pricked with a needle.

8th.—Right improving. Ocular congestion very slight. Conjunctiva of lower lid still thickened and filling up lower cul-de-sac. Near the free border are several small quite white hard nodules, smaller and more pyramidal than those in which the hairs were found.

12th.—Improvement continues, though photophobia persists. Cornea and iris normal; pupil atropised. No more hairs found. Lower palpebral conjunctiva remains thickened, slightly œdematous in appearance, and with small whitish papular elevations near free border of lid. Eye remains photophobic, but is almost free from congestion. Patient went back to the country, and was advised to continue treatment under the care of a medical man.

December 17th.—Came again. The eye has slowly improved since last visit, and seventeen days ago the atropine and other applications were omitted. Patient wearing smoked glasses. No photophobia. Slight injection of right eye, with noticeable dilatation of large episcleral vessels. Cornea clear; pupil circular and active, but smaller than its fellow. Conjunctiva of globe not thickened appreciably, but at lower outer border of cornea one small translucent papular elevation. Lower palpebral conjunctiva still tumefied and thick, but translucent-looking. No nodules or hairs visible. No conjunctival discharge. Examination with the ophthalmoscope revealed nothing abnormal in media or fundus. V. with correction of My. as. $= \frac{6}{8}$ partly.

The patient went home to the country, and I did not see him again till January 25th, 1895, when he came with a history of a recurrence of all his symptoms a few days after his last visit. He had been under treatment, and had had the eye tied up with a moist compress and bandage, and various local applications had been used. The condition of the eye was as follows:—Considerable photophobia, ciliary congestion, pupil contracted but circular, iris dis-

coloured ; no nodules visible, cornea apparently clear, but not well seen ; lower palpebral conjunctiva red and slightly tumefied ; some soreness of lid margins, very little pain. He was ordered to substitute a shade for the compress, and atropine and cocain drops were used.

January 26th, 1895.—Mr. Nettleship saw the patient in consultation ; the eye was less congested, pupil half dilated and circular, photophobia rather less, cornea clear, good fundus reflex, but careful ophthalmoscopic examination impracticable.

28th.—Sent to a nursing home, where he remained till March 15th. From the date of his admission till February 28th, *i. e.* a period of four weeks, there was but little change in the condition of the eye, although the symptoms varied a good deal in intensity. On several occasions the photophobia and lacrimation almost disappeared, the congestion became much less, the pupil reacted better to mydriatics, and the iris became brighter ; but such improvement lasted only for a day or two, and was followed regularly by an exacerbation of all the signs and symptoms. Pain was never a prominent symptom, but there were several short attacks of severe neuralgic pain in and about the eye. The tension of the eye varied but little ; at times it was slightly lower than that of its fellow. The treatment consisted in keeping the eye carefully shaded, applying a mydriatic (hyoscine and cocain in ointment were generally used) regularly three or more times a day, and occasionally leeching or blistering the temple. An ointment of equal parts of Ung. Hydrargyri and lanolin was rubbed into the skin of the brow every evening for the last two weeks. Strychnia and phosphates were administered internally.

From February 28th, 1895, the condition of the eye steadily improved, and on March 15th the patient was again sent home. The vision on that date was—

R. (the affected eye) $\left\{ \begin{matrix} - \ 3{\cdot}0 \text{ D.cyl.} - \\ + \ 0{\cdot}5 \text{ sph.} \end{matrix} \right\} = \frac{6}{18}$ partly.

L. $- 3$ D.cyl. $- = \frac{6}{8}$.

The media of right were clear, fundus well seen and apparently quite normal.

April 30th, 1895.—Patient seen again. No recurrence of inflammation. The right lids are not open so widely as left, but there is no photophobia, no congestion of ocular conjunctiva. Cornea and iris normal. Fundus normal. The lower palpebral conjunctiva on the right side is still somewhat thickened and irregular on the surface, but shows no nodular elevations.

V. : R. − 2·5 cyl. = $\frac{6}{6}$ partly. L. − 3 D.cyl. = $\frac{6}{8}$. Together $\frac{6}{5}$ partly and 1 J.

Soon after the patient first came under treatment I sent him to the Natural History Museum at South Kensington, asking him to look among the caterpillars until he found one the same as that which had been thrown at him. He did so, and picked out the *Bombyx rubi* without hesitation. As he was an intelligent lad with natural-history tendencies, this evidence is, I think, reliable.

I have found in medical literature of the last twelve years reports of eight cases of ophthalmia nodosa which seem reliable, and of one doubtful case. One writer (Hillemanns) refers to five cases in addition to the one he publishes, which were met with in the clinique to which he is attached, during the last few years. The name "ophthalmia nodosa" was suggested by Saemisch after seeing three or four instances of the affection at the Bonn clinique in the years 1890—1892. The cases occurring previously, in which the true causation of the disease had been established, were published under various titles.* The earliest was one brought forward by Pagenstecher at the Ophthalmological Congress at Heidelberg in 1883; this was followed by one by L. Weiss in 1889; Wagenmann in 1890 reported one case, Krüger in 1891–2 described three examples, Becker in 1892 one case, and Hillemanns in 1894 published one case. The case I bring forward this evening, and which is, so far as I know, the first reported

* See abstracts of published cases in Appendix.

instance of the disease in this country (though probably not the first which has occurred), brings the number up to nine.*

All these cases had certain features in common, and in all the diagnosis was established by removal of hairs or portions of hairs from the ocular or palpebral conjunctiva, sclera, cornea, or iris.

There has generally, but not always, been a history of injury to the eye by a caterpillar, which in most instances has been playfully thrown at the patient; in the absence of this history there is one of sudden onset of symptoms in one eye, consisting of pain—not as a rule very severe,—much photophobia, and lacrimation. These symptoms tend to subside after a short but varying duration, but do not wholly disappear; in the course of a few weeks an exacerbation of the symptoms occurs, and then but not till then in most instances, the patient comes under observation. In only one of the hitherto recorded cases (Krüger, Case 2) was the interval between the onset of the disease and the date on which the patient was first seen by an ophthalmic surgeon less than two months. My patient, however, came under observation two weeks after the injury.

On examination the eye is usually found to be much congested, the congestion being patchy, and both conjunctival and episcleral in type. The cornea is more or less infiltrated, sometimes vascular. There are the ordinary signs of iritis or irido-cyclitis, often with numerous posterior synechiæ, and in some instances with exclusion or occlusion of pupil; occasionally diminished tension, opacities in the vitreous, and in one case (a doubtful case of ophthalmia nodosa) detachment of retina. The most noteworthy feature, however, consists in the presence of nodules in the conjunctiva, episcleral tissue, and iris; the favourite site appears to be the ocular conjunctiva between the lower border of the cornea and the fornix, but they are found also in the palpebral conjunctiva, the retro-

* This does not include one of Krüger's cases in which the diagnosis was doubtful, nor those cases referred to but not published by Hillemanns.

tarsal folds, and in the deeper tissues ; they are multiple, occasionally grouped, and have varied in number from three to twenty-six. These nodules are round or oval, flattened, grey or yellowish, and semi-translucent in appearance, firm when touched with the finger, and generally less vascular than the surrounding conjunctiva if in this coat. Their size has been variously given as that of millet seeds, pins' heads, or more accurately 1 to 2 mm. in diameter. When situated in the iris they are said to be rather larger than when in the conjunctiva.

Becker, one of those who has written upon the subject, says that these nodules or tubercles do not develop in man till three months after the injury to the eye ; this, however, is not strictly correct: in one case (Krüger, Case 2) a plentiful supply of well-developed nodules was observed two and a half months after the injury, and in my patient nodules were visible three weeks after the accident.

The subsequent history of a case is one of repeated remissions and exacerbations of the signs and symptoms ; this is well exemplified in my case, as the eye became so much quieter about two weeks after treatment was begun that the lad went home, and for some weeks was so free from pain or lacrimation that it was hoped the attack had passed off permanently. In all the recorded cases, including my own, a period of at least six months has elapsed before the symptoms entirely disappeared, and in one instance (Krüger, Case 4) recurrent attacks of inflammation were noted for two and a half years.

The nodules when not excised are said to shrink, and eventually disappear ; if in the deeper tissues, *e. g.* iris, permanent deformity (scarring) may result, and, as mentioned earlier, the pupil may become wholly or partially blocked by inflammatory exudation. Herein there is, of course, no great difference between this and other forms of iritis. Ulceration, either of the nodules or of the tissues in which they are situated, has never been observed.

The nodules, which form one of the chief characteristics of the disease, have on several occasions been removed,

and microscopic sections of them examined. In fact, it was this procedure which first led to the determination of the true nature of the affection. Their histological characters very closely resembled those of tubercle, and only the section of hair in the centre of the nodule, prevented them being looked upon as such ; their naked-eye appearances had strongly suggested a clinical diagnosis of tubercle. The minute structure of one of these nodules is well depicted in the plate which accompanies Krüger's paper, and which I now show.

The treatment adopted in the reported cases has been in the main symptomatic ; no one drug has been hitherto recommended as specifically useful. The local remedies employed have been those generally in vogue in iritis,—mydriatics, local depletion, and counter-irritation and application of heat. In my patient one of the peculiarities was the defective reaction of the iris to atropine or other mydriatic, the drug having to be applied very frequently in order to keep the pupil even moderately dilated. This has also been noted by Wagenmann in his case. Mercury has been administered in several cases, but without striking results. Operative treatment has been limited to iridectomy to combat the results of the iritic inflammation, *e. g.* blocking of pupil or secondary glaucoma, and for the removal of nodules and portions of hairs, and the excision of nodules in the conjunctiva or episcleral tissue.

The prognosis in ophthalmia nodosa, judging from a study of the cases hitherto recorded, must be guarded ; and the opinion given will necessarily depend upon the severity of the case, the extent of structural change present, and the date at which the patient comes under observation. It would seem from the history of my case, which I might here remark was in some respects less severe than any previously recorded, that the deep penetration of the hairs does not appear to have much influence on the duration of the disease.

In no case has sight in the affected eye been destroyed,

although in several (Krüger, Becker, Hillemanns) it has been seriously damaged.

As to diagnosis, the chief and perhaps the only ocular lesion with which ophthalmia nodosa is liable to be mistaken is a tubercular iritis; and the difficulty is not likely to be insurmountable. Excision and examination of the nodules will in a doubtful case determine the nature of the disease, should the clinical features not be sufficiently distinctive.

Turning our attention now to some more general facts in connection with this disease, I may point out that, as it is natural to expect, all the reported cases have occurred among the rural population. No case has occurred in a town dweller. The penetration by the caterpillar hairs must occur during a limited period of the year, that is to say, when the caterpillars are in active existence. In one of the reported cases the date was definitely stated to be in the month of June. In all the others the date of injury, so far as it could be fixed, was in August, September, or October.

It is popular knowledge that the hairs of certain caterpillars give rise to a kind of urticaria of the skin, with redness, itching, and burning sensation; and among entomologists those possessing this objectionable quality are known as urticating caterpillars.

Inflammation of the conjunctiva of a comparatively mild type, and occurring as a localised epidemic affection, has been traced to the irritation of the conjunctiva by hairs of the caterpillar of *Cnethocampa processionea*. Wagenmann (see Appendix) refers to a number of cases of this kind occurring at Eisleben coincidently with the invasion of the town park by these larvæ; and Baas* reports two similar cases in workmen employed in destroying these caterpillars in a wood which they had infested.†

* Zehender, 'Klin. Monatsbl.,' 1888, vol. xxvi.

† See also a paper by Landon, "Observations on the Procession Caterpillar and the Etiology of Epidemic Urticaria," 'Virchow's Archiv,' 1891, Heft 2, s. 220.

The determination of the kind of caterpillar by which the more severe disease we are now discussing is caused is seldom easy, and occasionally impossible. In Pagenstecher's case the kind could not be determined. In Weiss's case it was probably, but not certainly, *Lasiocampa pini*; in Wagenmann's case probably *Lasiocampa pini*. In Krüger's first case it was certainly *Lasiocampa rubi*, or, as usually called, *Bombyx rubi*, and in his other two cases probably the same. In Becker's case it was *Bombyx rubi* or *pini*. In Hillemann's case it was the caterpillar known in Germany by the popular name "Bärenraupe," and which is the *Bombyx rubi*. In my case it was with scarcely a doubt *Bombyx rubi*.

Thus in all the cases in which the kind of caterpillar could be determined even with probability it was one of the family Bombycidæ: the *Lasiocampa pini*, or larval form of the Pine-moth, is not found in this country, but is apparently common in some parts of Germany. Some of the German writers mention that workmen protect their hands against this caterpillar by wearing gloves. The *Bombyx rubi*, the caterpillar of the Fox-moth, is common in this country, and probably many here are familiar not only with the moth, but with its larval form. Both of these I am able to show in a dried state, and, thanks to the courtesy of the Rev. Canon Fowler, one of the secretaries of the Entomological Society, I have been allowed to borrow from the Society's library vol. iii of Buckler's 'Larvæ of British Butterflies,' which contains probably the best existing plate of this particular caterpillar.

The Fox-moth caterpillar feeds on heath, heather, grass, hazel, sallow, bramble, willow, and other plants, and does not appear till the month of August: I am unable to say the earliest time at which the Pine-moth larva appears, but if Weiss's patient's statement is correct, it must be at least two months earlier in the year than the former kind. No instances of serious eye disease, the causation of which has been traced to caterpillars other than these Bombycidæ, have been recorded;

but there are numerous other varieties which are known to have an "urticating" effect upon the skin, and which would, in all probability, induce ocular lesions if the hairs penetrated the tissues of the eye. This affection, ophthalmia nodosa, must, under ordinary conditions, be rare, and we might venture to hope that if it becomes common knowledge that inflammation which seriously endangers sight may be set up by caterpillar hairs, people will cease to use these larvæ as missiles to throw at their friends, or even at their enemies.

The explanation of the penetration of the hairs into the tissues, not only on the surface, but deep in the eye, demands more than a passing notice, and it seems reasonable to suppose that there is something in the construction of the hair which at least partially accounts for their power of burrowing, if I may use the term. They are doubtless assisted by the rubbing of the eye by the patient to relieve the irritation which immediately follows the injury.

The hairs of some caterpillars are known to have a surface layer of cells arranged like the tiles on a roof, and such an arrangement on a sharp-pointed hair would seem admirably adapted to assist the migration of the hair in the tissues.

Lord Walsingham kindly sent me (through the Rev. Canon Fowler) a note on the hairs of the *Cnethocampa processionea* larva, which reads as follows :—"The larva of *Cnethocampa processionea* is armed along the back with short brushes of hairs surrounded by longer hairs. These short brushes are easily detached, and should they rest on the hand or face and be accidentally rubbed into the flesh they produce a strong urticating effect. Each of these hairs will be found under the microscope to be armed with short points, arranged in the form of a screw ; and as the base of the hair is pointed as well as the apex, they are easily made to penetrate the skin. It is not the point of the hair which works in or causes much irritation, but the base, and it is believed that there must be a gland

at the base of these tufts which secretes some strongly irritating acid. *Porthesia chrysorrhœa* and other Bombycidæ among our English species produce the same effect in a minor degree. *Bombyx rubi* has also a bad reputation, but I have handled it frequently without inconvenience by touching it delicately, so as not to rub off the hair at the base."

In the hairs removed from my patient (shown in the next room), when highly magnified, there are indications of a notched or corrugated surface near the tip of the hair, which is very sharp-pointed. The proximal end of both the hairs shows an irregular fracture where it has been broken off.

I have hitherto been unable to learn much as to the structure and shape of the hairs of the particular Bombycidæ in question, but I hope by a further search among entomological literature to discover more detailed description of them. So far as I have ascertained by inquiry it does not seem possible to determine with certainty the species of caterpillar by microscopic examination of the hairs.

The sole remaining point I wish to discuss concerns the exact way in which the pernicious effects of the penetration of these hairs is brought about. Are the structural changes induced simply the result of the mechanical irritation of the tissues by the sharp notched hairs, or is there, in addition, a poisoning of the tissues by material contained in the hairs or resulting from their disintegration in the tissue in which they become embedded? Careful consideration of the clinical aspects of the already recorded cases, and of the case I have brought before you to-night, has led me to the opinion that the lesions are mainly, though probably not wholly, the result of a specific poison contained in the hairs. This is the view held by several of the previous writers, and seems to me the only one which will at all adequately explain the severity, long duration, and relapsing character of the inflammation. My case seems of some value in the

elucidation of this point, for it differed from those previously reported in that there was no evidence of penetration of hairs deeper than the conjunctiva, and yet definite and prolonged affection of the iris and probably of the ciliary body resulted. In all the other cases nodules were seen in the iris, and therefore, presumably, hairs had become embedded therein.

Further support of the view that the changes are induced by a poison is furnished by Leydig's* observations on the skin and skin-glands of the larva of *Bombyx rubi*. An excerpt from his paper is given by Weiss in the 'Archiv f. Augenheilkunde,' with a woodcut of the hair and glands from this caterpillar. Karsten has also made similar observations.

Becker and Krüger made some experiments on rabbits by rubbing caterpillars (*Bombyx rubi*) against the eyeball; the hairs or fragments of them penetrated the conjunctiva and cornea, and were found in the latter tissue three months afterwards. Although the cornea became infiltrated in places, no nodules formed, and no giant-cells were discovered on examination, nor were any nodules or hairs found in the iris. Becker found that the effect upon the rabbit's eye when a dead caterpillar was used was much less than that produced by a live one.

The nature of the poison contained in these glands and hairs is a matter of conjecture; Landon (loc. cit.), in reference to the larva of *Cnethocampa processionea*, suggests that it is formic acid.

We may perhaps conclude, from the almost invariable history in these cases, that the symptoms which immediately follow the contact of the caterpillar with the eye are due to mechanical irritation by the hairs, and that these early symptoms pass off in a comparatively short time as the hairs become buried. After an interval which varies, but is usually some weeks, and during which there is little irritation, the effects of the poison

* 'Müller's Archiv,' 1855, p. 389, "Zum feineren Bau der Arthropoden."

become manifest, and continue with varying severity for a period of several months.

In conclusion I wish to express my indebtedness to Messrs. Waterhouse and Kirby, of the Natural History Museum, and to the Rev. Canon Fowler of Lincoln, and Lord Walsingham for their kindness in assisting me in my search for information concerning caterpillars.

(*June 13th*, 1895.)

Mr. Hartridge suggested that the prolonged irritation might more probably be due to the migration of the buried caterpillar hairs than to the introduction of a poison at the time of the initial lesion.

Mr. Donald Gunn referred to a report, for the truth of which he could not personally vouch, that our troops in India were liable to inflammation of the eyes supposed to be due to the smooth-skinned green caterpillar crawling over the surface of the eyeballs while the men were asleep.

Mr. Lawford, in reply, said the migration of the hairs appeared to take place only during a short period of time after their penetration. They then became surrounded by a collection of cells which chiefly formed the little nodules referred to, and there they appeared to remain until they underwent disintegration of some kind. He was inclined to think that the wandering of the hairs would scarcely explain the exacerbation of the symptoms. Then, again, in his own case the important symptoms appertained to the iris and ciliary body, and yet there was no evidence that the hairs had reached the iris, no nodules having developed, and the inflammation not being of a plastic type, as it had been in the cases in which the hairs were definitely embedded in the iris tissue: nevertheless the characteristic symptoms and signs waxed and waned for some months. He was not cognizant of the affection alluded to by Mr. Donald Gunn as occurring among the troops in India; that affection must, however, differ materially from the disease under discussion, since

in the latter the penetration of hairs into the eye was an essential factor in its causation.

Abstracts of Published Cases.

1. Pagenstecher.—*Bericht d. Ophth. Gesellsch.*, Heidelberg, 1883. *Zehender's klin. Monatsbl.*, vol. xxi. Case published under the heading "*Interesting preparations from an eye, caused by the penetration of fine caterpillar hairs into the conjunctiva and iris, with the development of nodules like tubercles.*"

Female child æt. 10 came under observation at the end of February, 1883. History meagre: five or six months previously, after playing in the sand, slight inflammation of the right eye ensued, but soon passed off. Present attack said to have begun four weeks ago.

On admission.—Right: in ocular conjunctiva small nodules, size of millet seeds, firm greyish-yellow colour, in some places grouped, in others discrete. Most numerous in fornix down and in. Twenty-six nodules counted. Some small grey nodules in iris. Conjunctival nodules removed, cut with freezing microtome, and examined. They showed exactly the structure of tubercles, exactly that in the middle of each was a section of a hair.

Four weeks later child again brought to the clinique. The right iris was now swollen, and showed several nodules very plainly. Lower and inner portion of iris removed, and on examination the nodules exhibited exactly the same structure as those from the conjunctiva. The condition of the eye slowly improved, and the nodules, which had not been removed, disappeared.

2. Leopold Weiss.—*Archiv f. Augenheilk.*, xx, 1889, p. 341: "*A case of severe inflammation of the iris the result of penetration of caterpillar hairs.*"

A man æt. 51 came to the clinique, December 3rd, 1888, with a history that on June 16th, 1888, a hairy caterpillar fell into his left eye. Severe inflammation ensued,

but subsided under treatment in a few days. In October, after exposure to cold, inflammation again supervened and continued, but with remissions.

On admission, left severe inflammation, cornea streaky, iris much thickened with nodules in it, numerous posterior synechiæ; changes in the iris most marked in lower part, where four or five fine hairs could be seen embedded in the iris tissue with one end free in the anterior chamber.

Under treatment the conditions underwent some improvement; pupil dilated irregularly: some hairs removed from cornea.

On January 3rd, 1889, iridectomy down and out, followed on third day by some recurrence of iritis. In March a second iridectomy, and sight subsequently improved. Portion of iris removed at first operation, hardened and sections made. At pupillary border very little change. Near this iris much thickened, and in thickened part hairs seen cut across. Microscopic appearances of nodules in which hairs were situated closely resembled those of tubercle. Caterpillar was determined to be the Pine-moth caterpillar (*Gastropacha pini*). The hairs of this are known to be irritating to the skin, and (in Germany) labourers protect their hands with gloves. This caterpillar is said to be very abundant in Germany.

3. Aug. Wagenmann.—*Archiv f. Ophthal.* vol. xxxvi, 1, p. 126, 1890: "*Pseudo-tubercular inflammation of the conjunctiva and iris from caterpillar hairs.*"

This case, occurring in a boy æt. 9, was observed in Leber's clinique in Göttingen in 1886. Patient came 20th January, 1886, with a history that the right eye became inflamed four months previously, after being struck by a dark brown hairy caterpillar thrown at him by a playmate.

On admission, right circumcorneal injection, especially on nasal side, where there are two or three small flattened yellowish nodules. Cornea clear. Two posterior synechiæ. Below lower pupillary border a fine pointed prominence the same colour as iris is visible on surface

of iris, and at lower inner part a similar but less distinct projection. Good fundus reflex; no details visible on account of photophobia. The nodules at nasal border of cornea were excised and examined. The pupil reacted badly to repeated atropine drops. The eye eventually recovered with good vision.

Microscopic examination of the portion of tissue removed showed structure closely resembling tubercle, with numerous giant-cells; each nodule contained as its centre a section of a hair. Staining for tubercle bacilli gave negative results.

The caterpillar in this case was probably, but not certainly, *Gastropacha pini.*

4. E. Krüger.—*Arch. f. Augenheilkunde,* Bde. xxiv and xxv, 1891–2. *Archives of Ophthal.,* vol. xxii, 1893: "*Ophthalmia nodosa caused by penetrating caterpillar hairs.*"

Notes of four cases occurring at the Bonn Clinique, and called by Saemisch "ophthalmia nodosa," characterised by multiple small nodules in conjunctiva, sclera, and iris, with severe irido-cyclitis and keratitis. (Case No. 3 is omitted, as no hairs were found, and it is open to doubt whether it properly belonged to this class.)

Case 1.—Peasant woman, æt. 23, came to hospital January 6th, 1891. Left eye inflamed since September, 1890, after being struck by a caterpillar thrown at her.

On admission.—Left eye much pericorneal injection. Greyish-red nodules in lower part of anterior cornea, and several yellow-grey nodules in iris, which was hyperæmic and discoloured. Severe pain. Some days later another nodule developed in the iris, and ten yellowish-white nodules in the ocular conjunctiva below, and two on nasal side.

Some of these nodules, removed and examined, showed structure closely resembling tubercle, and containing a central hair in transverse section.

The inflammatory signs abated and recurred during a period of six months, and then became less severe. The

eye eventually became free from redness and pain, but when last examined showed posterior synechiæ, opacities in vitreous, and some choroidal atrophy. The caterpillar in this case, identified by the patient, was the *Gastropacha rubi.*

Case 2.—Man æt. 26 came to hospital November 5th, 1891. Left eye inflamed since September 14th, 1891, the attack coming on after working in a field of oats. Conditions as to conjunctiva and iris very similar to those of Case 1, and some conjunctival nodules were removed for examination. The structure of these was exactly like that in the previous case, and in each nodule a portion of hair was found. There was no history of injury by a caterpillar; it seemed probable that the species was the same as in the former case, viz. *Gastropacha rubi.*

Case 3.—Omitted.

Case 4.—Male æt. 13 came to hospital March 12th, 1892. Since September, 1889, liable to constantly recurring inflammation of right eye. History that when in a hay-field his brother had thrown a dark brown caterpillar at him, which had struck his eye. When seen, severe iritis, with posterior synechiæ and exudation; numerous small yellow-grey nodules in conjunctiva, one such in iris, and a hair in cornea were visible on careful examination. Conjunctival nodules removed and examined microscopically, and found to contain light yellow brown hair, judged to be from the *Gastropacha rubi.* The eye slowly recovered.

5. Becker.—*Berliner klin. Wochenschrift,* May 30th, 1892: "*A case of pseudo-tubercular ophthalmia from the penetration of caterpillar hairs.*"

This case occurred in a boy æt. 5, brought to the Marburg Clinique, January 2nd, 1891, on account of inflammation of left eye with a history that about three months before a hairy caterpillar had been thrown into his eye.

On admission.—Left eye, pericorneal injection; minute

nodules in sclera or ocular conjunctiva, down-in ; in iris several small spots like scars; posterior synechiæ; iris generally atrophic. Two conjunctival nodules removed and examined; each one contained a hair in centre, numerous spindle-cells arranged concentrically, and giant-cells. One year later nodules all gone. Pupil shows results of iritis; iris scarred, V. $= \frac{2}{10}$. The caterpillar in this case was thought to be *Gastropacha rubi* or *Gastropacha pini*.

6. Hillemanns.—*Deutsche med. Wochenschr.*, June 14th, 1894 : "*Ophthalmia nodosa*" (Saemisch).

Patient was a weakly man, with numerous scars of glandular abscesses. Came to the hospital January 15th, 1894, with a history that in August, 1893, he had been struck in the eye by a large brown caterpillar ("Bärenraupe"); this was followed by severe pain, and a few days later the eye became much inflamed. An iridectomy was subsequently performed, but with no appreciable result.

On admission.—Much congestion of the eye, which showed six small prominent nodules, three in conjunctiva and three in subconjunctival tissue. Nodules 1 to 1·5 mm., firm, their colour obscured by injected conjunctiva. Cornea diffusely infiltrated. Iris discoloured; posterior synechiæ. In iris near nasal ciliary border two small raised grey-red nodules; vascular cyclitic exudation behind iris. T. — ; V. = fingers at four feet. Two larger nodules in conjunctiva excised and hardened, and examined microscopically ; they showed sclerosed hyperæmic conjunctival tissue, an area of small round cells, and among these numerous epithelioid cells often collected into heaps, and giant-cells. In addition to these appearances, which are those of tubercle, there was in each nodule a section of a hair with a brownish-yellow outside structure, and clear medullary substance. Under treatment the inflammatory conditions subsided, but a progressive diminution of vision continued.

Hillemanns only gives the popular name of the cater

pillar in the above-mentioned case (Bärenraupe). He refers to others occurring in the Bonn Clinique, in which the caterpillar was determined with moderate certainty to be the *Gastropacha rubi*. Altogether six cases of ophthalmia nodosa had been met with in the Bonn Clinique in recent years.

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3. *Formol as a hardening reagent for eyes and other tissues.*

By C. Devereux Marshall.

During the last three months I have been using formol as a hardening reagent for eyes, and as the results have seemed to me to be satisfactory I have ventured to bring the subject before the Society this evening, believing this to be a distinct advance upon the older method of hardening in Müller's fluid.

The attention of ophthalmologists was directed to this substance by Prof. Leber at the International Congress held in Edinburgh this year; it had previously been used by Dr. Blum for the preservation of animal and vegetable substances, and by Dr. Edinger for the preservation of eyes.

This substance is supplied under two names, one being formol and the other formaline, but Mr. Martindale tells me that they are identical. The active principle of both is formic aldehyde (CH_2O.). This is obtained in the form of a gas from wood spirit by oxidation; it dissolves in water to the extent of 40 per cent., producing our so-called formol or formaline.

It is a most powerful disinfectant and deodorant, and its antiseptic properties are said to be quite equal to, or greater than, those of corrosive sublimate. It is clear like water, and has a peculiar smell. It readily penetrates tissues and hardens them with great rapidity. It is by no means expensive. The strength in which I

have used it is that recommended by Prof. Leber, viz. 10 per cent. of formol in water.

Directly after removal the eye is placed in this solution for twenty-four hours or thereabouts. At the end of that time the globe has a firm consistency, and can be cut open with a sharp knife, being held only between the finger and thumb, and resting only on a piece of cork or india-rubber.

If the eye be left in for a longer period it does not appear to make any difference, nor to over-harden the specimen, nor make it brittle, as is so well known to be the case with Müller's fluid, and especially with perchloride of mercury. The various parts of the eye retain in a remarkable manner their natural appearance.

The cornea and the lens remain transparent, the sclerotic and optic nerve remain quite white, and the colour of the iris is unaltered. If blood or pus be present in the anterior chamber, this is fixed there, and does not escape when the eye is cut open. These points are shown in the various specimens I have brought here this evening.

The vitreous remains in its natural state.

The retina and choroid retain their clear look and remain *in situ*. I have now examined between eighty and ninety eyes hardened in this way. If now we wish to mount the eye as a jelly specimen, all that is necessary is to wash it for a few minutes in water, and then to put it into glycerine and water 1 in 3 for twenty-four hours, then in glycerine and water 1 in 2 for a similar period of time, and finally to mount it in the usual way in glycerine jelly. We thus have very rapid hardening, and entirely save the week or more that has to be spent in decolourising the specimen after hardening in Müller's fluid ; we also do away with the necessity of freezing the eye before opening it, though as an extra precaution it may be frozen and sawn open in the usual manner. The only point to be specially careful about is that a very sharp knife must be used. I, as a rule, use a flat brain-knife very like an ordinary table knife. A razor

is unsuitable, as the back is too thick to allow the blade to go through nicely.

Next with regard to microscopical sections, the best results are generally obtained by embedding in celloidin, and cutting under alcohol.

After the eye has been bisected it must be thoroughly dehydrated in spirit and absolute alcohol, and then after soaking for a day or two in celloidin it is embedded, and the celloidin is hardened in methylated spirit, where it should remain for twenty-four hours at least, before being cut on the microtome. The specimen may be left any length of time in spirit before being cut; the block improves rather than deteriorates by keeping.

After preparation in this way the sections can be stained with logwood and eosin, or with hamalum and benzo-purpurin.

There is a further advantage, and that is the very remarkable way in which blood in the vessels or extravasated into the tissues retains its colour, and the way in which the blood-corpuscles retain their shape; they are nothing like so shrunken and crenated as they are after hardening with other reagents.

This is well shown in some of the microscopical specimens exhibited this evening. The cells of the tissues are much less altered also.

Whether this reagent acts as a true fixing substance for the cells or not I do not know, but I should think it probable that it does, owing to its extreme rapidity of penetration: this is a point I am trying to determine.

I have noticed that in some of the specimens a certain amount of shrinking has taken place after they have been put up in glycerine jelly, and in some the retina has become somewhat detached. I am not at present quite certain as to the cause of this. It is possibly due to my not having kept them in glycerine and water long enough before mounting them.

I am now trying various means in order to prevent this occurring. I have seen it in a few specimens where the

retina has been detached, and where the subretinal space contained a quantity of coagulated albuminous material. This should certainly be removed, so that its place may be taken by the glycerine jelly, which does not shrink.

A paper has just appeared in the 'Annali di Ottalmologia,' by Professor Guaita, of the University, Siena, in which he gives his experience of formol, both in the laboratory and as a therapeutic reagent. His experience is very much what mine has been, as far as its preservative and hardening properties are concerned.

Valude has also used it extensively in his Clinique.

I shall be very interested to hear the experience of any members of the Society who may have used formol.

(*December 13th*, 1894.)

Dr. Lindsay Johnson said he had abandoned the use of formol for the preparation of microscopic sections of the eye at least fifteen months ago. He had used formol prior to that under the name of methylal. The formic aldehyde (CH_2O) was first used for microscopic preparations by Parker in 1892, and was, as above mentioned, commonly known as methylal, and the formol now recommended is the identical substance under another name. Formol is very useful for preserving museum specimens, as it leaves them unchanged in colour, and does not contract them, but its usefulness in microscopy is limited to "Golgification "and the methylene blue method of staining nerve tissue. It is valuable in the former case because it precipitates silver from a nitrate of silver solution in the presence of an alkali, and in the latter because it is a useful substitute for alcohol, which cannot be used, since it dissolves out the methylene blue. He cautioned them against its use in concentrated solutions because of its irritating effect on the mucous membrane, but indicated at the same time that the fumes of nitric acid counteract this irritating effect.

Dr. Vernon Cargill.—I have used formol in 10 per cent. solution for hardening the eyes in the laboratory of

the Royal Eye Hospital, Southwark, for the last three months, and my experience quite coincides with that of the author of the paper.

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4. *The extraction of transparent lenses in high myopia.*

By Charles Wray.

It seems agreed upon among Continental authorities that the removal of transparent lenses should be restricted to myopia of over 10 D. in children and 12 D. in adults.

The operations have three specific aims: (*a*) to prevent detached retina; (*b*) to arrest or prevent retino-choroidal changes; and (*c*) to enable patients with the highest grades of myopia who cannot work at reading distance to do so.

To get an idea of the course of myopia above 10 D., by the courtesy of Mr. Spencer Watson and Dr. W. J. Collins I have been able to examine the out-patient letters of 17,000 cases. Out of these, together with 5000 of my own and nearly 3000 of Mr. Phillips's refraction notes, I have obtained for statistical purposes 123 cases of myopia over 10 D., *i. e.* cases for which operation would be entertained.

Of 246 eyes, representing 123 patients, 58 eyes (including 3 with detached retina) had V. less than $\frac{6}{36}$, so that in all 55 out of 58 eyes were lost from changes in the retina and choroid.

Age.	Cases.	Patients with one eye less than V. $\frac{6}{36}$.	Patients with two eyes less than V. $\frac{6}{36}$.
6—14 ...	19	... 5	... 2
14—28 ...	55	... 19	... 2
28—42 ...	24	... 7	... 3
42—56 ...	17	... 3	... 1
56—70 ...	8	... 4	... 2
		38	10

The figures admit of two deductions, namely, that retinal detachment is less to be feared than the changes in the retina and choroid (three of the former to fifty-five of the latter), and that it is not necessary to look upon every myope of 12 D. and upwards as hopelessly drifting towards detached retina or visual inadequacy from retino-choroidal changes, and especially seeing that the patients on whom these statistics are based were mostly very poor, and many had chosen unsuitable occupations.

As regards Fukala's operation and detachment, Widmark collected 131 cases, to which may be added 43 more. De Wecker and Valude saw a case of double detachment. Van Millingen had seen a case which he attributed to the operation, and I have also seen one.

The above figures confirmed de Wecker's impression of the relative frequency of this condition after operative treatment.

In view of the rarity of detachment in the natural course of events, and its not inconsiderable frequency after removal of the lens, it is plain that if operations are justifiable it is to prevent retino-choroidal changes and to aid work at reading distance.

Meyer operated on a young subject, a myope with lamellar cataract, but found it had no effect on the progress of the changes in the fundus; whilst Parinaud found he had to weaken the reading glasses gradually to + 2 after the removal of a congenital cataract; which appear proof that the removal of the lens cannot prevent the development of myopia. However, for the operation to be beneficial it is not necessary that it should prevent the development of a myopic refraction, all that is required is that it prevent those changes in the fundus which are apt to reduce vision below the patient's requirements.

Fukala operated on one eye in a patient with two myopic eyes, with the result the myopia ceased to increase in the operated eye, but progressed in the other. Side by side with this may be placed a case of Schmidt-

Rimpler's, in which the fundus changes in the operated progressed equally with those in the non-operated eye, as in Meyer's case above alluded to.

It is a matter of every-day observation that in myopia of low degree associated with zonular cataract in children the crescent is at times out of all proportion to the amount of myopia, and the presumption has been that it is due to the amblyopia induced by the want of transparency of the lens, and in the first and second decades few surgeons hesitate to remove it even if the patient with glasses could see $\frac{6}{24}$. Unfortunately hospital reports do not furnish the subsequent history of these cases.

Having noted the influence of amblyopia in the development of choroidal changes in lamellar cataract, it will be permissible to refer to amblyopia in high myopia. Few myopes of over 10 D. see more than $\frac{6}{18}$, and in the fourth decade visual acuity has invariably fallen to $\frac{6}{24}$.

In young myopes of 12 D. and upwards with V. $\frac{6}{18}$, is the amblyopia likely to act as it does in myopes with lamellar cataract? If so, the question immediately arises, should the lens be removed? The answer would depend upon the prospects of improving the vision and the risks of the operation. As regards the former, Pflüger, Schirmer, Thier, von Hippel, and Fukala have recorded some extremely brilliant cases, though the improvement resulting, as in other cataract operations, varies between wide limits; but at the same time there is considerable unanimity that the patients were enabled to work better at reading distance, and to follow occupations for which in the absence of operation they would have been incapable.

Schirmer reports two cases of 18 D. myopes with V. $\frac{1}{5}$ and $\frac{1}{4}$, and $\frac{1}{4}$ and $\frac{1}{3}$ respectively before operation, and $\frac{1}{2}$ and $\frac{2}{3}$ afterwards.

This evidence is of value as regards the possibility of improving the vision by Fukala's operations.

As regards the prevention of changes in the choroid and retina, the only cases that would appear to bear upon the

point are Schmidt-Rimpler's and that published by Meyer, in which, after the removal of a lamellar cataract from a myope, the fundus changes progressed ; and judging from the statistics above alluded to they certainly progressed more rapidly than they would have done in all probability in the natural course of events.

The safety of the operation can be measured partly by the published cases, and partly on the basis of the statistics of cataract extractions.

On the whole, if a patient be unable to work at his occupation on account of the difficulty he experiences in working at reading distance, it might be permissible to do an operation on one eye, though it should not be done if the tension of the eye is reduced, or floating opacities exist in any number in the vitreous, and probably also when vision has been reduced much below $\frac{6}{60}$ by profound changes in the macula ; and for two reasons : in the first place, there would then be no possibilty of improving vision ; and in the second place, if left alone the patient would probably remain *in statu quo*.

Probably the safest time to do the operation would be at the beginning of the second decade, and not improbably the result as regards visual acuity would be better in the event of early operation, as the tables seem to show a progressive deterioration with the increase of age.

As regards the patient on whose case I seek the advice of the Society, he is a lad with 25 D. of myopia and V. $= \frac{6}{36}$. If left alone it will be impossible for him to use his eyes for prolonged work at working distance on account of the amblyopia superimposed on his very high myopia, and in addition he will not improbably be practically blind by the time he is forty. Would an operatiou on one eye be justifiable ?

(*January* 31*st*, 1895.)

Mr. Spencer Watson said it was quite a new subject to him. He did not know of anyone in this country who had extracted a lens for high myopia. If there were

any present who had done so he would be glad to hear what they had to say about it. Personally he would hesitate very much before performing such an operation. It was not at all likely to attain the object they had in view which the author suggested it might be likely to effect. He did not know whether removal of the lens would be the means of arresting the changes that went on in progressive myopia, and it would require many more facts before he would be inclined to value the practice. He had on one occasion removed a lens with very high myopia, but it was a cataractous one. The lens was removed with the capsule because in the course of the operation it was found that the suspensory ligament was very loose, and the capsule of the lens very tough, so that it was easier to remove the lens within the capsule than by the ordinary method. There was some loss of vitreous, but nevertheless the patient did very well, and was able to see well afterwards. In these cases of high myopia there was always a danger of having a diffluent vitreous, and therefore one ought to hesitate before performing any operation of this kind.

Mr. Lang said he had removed the clear lens by discission from a man aged nineteen, whose vision with $-$ 22 D. $= \frac{6}{36}$. The fundus was fairly healthy; no vitreous opacities and no central choroiditis, only a large crescent.

The patient was a porter, and came for advice because he could not see to follow his occupation, neither could he wear glasses. After the operation he could see $\frac{6}{24}$ without glasses, and letters of $\frac{6}{12}$ with a concave cylinder. He was able to work well for three months, then the retina in this eye became detached, and some months later the same thing occurred in the non-operated eye. In a second and similar case the result of the operation was equally satisfactory for a time, but unfortunately a needling of the posterior capsule was followed by suppurative inflammation, and the sight was lost, though the eye was saved by the use of chlorine water.

Mr. Lang had noticed a tendency to detachment of the retina some time after the successful removal of senile cataracts in patients with high degrees of myopia, and his present experience seemed to show that this tendency was not confined to old people.

Mr. Doyne wished to ask one practical question. In an amblyopic myopic eye, by virtue of the larger retinal image would not the patient see better before than after the index of refraction had been reduced by the removal of the lens?

Mr. Devereux Marshall said he had had charge of two patients operated upon for this condition, but the results had not been satisfactory. In the first case the retina became detached shortly after the operation. In the second case the patient was a feeble subject, and after the second or third needling the eye was lost from suppuration taking place.

Mr. Wray, in reply, said he had laid emphasis on the fact that this operation should not be done when there were many opacities in the vitreous or any softening of the eyeball. The case he had seen that had been operated on was supposed to be a case of cataract, but, as a matter of fact, was a case of lenticonus. The same condition was present in the other eye, and with the lens *in situ* vision could be improved to $\frac{6}{12}$.

The statistics on which his paper was based were not given *in extenso*, but were said to show that in cases of myopia of over 10 D. there was a steady deterioration of vision from the second to the fourth decade. In the second the average vision was $\frac{6}{18}$, in the fourth less than $\frac{6}{24}$.

As regards operative interference, Mr. Wray thought highly myopic eyes that are allowed to work for several decades are apt to become unsuitable cases for operation. If such severe methods are applicable, the longer they are postponed the more risky they become, for the removal of the crystalline lens in high myopia practically amounts to the removal of immature cataract from unsound eyes at an age when the danger is greatest.

5. *Case of high myopia treated by removal (by needling) of both lenses.*

By G. Lindsay Johnson.

George E—, æt. 15, came to me in February, 1893, for advice. I found—

R. V. $= \frac{20}{100}$ with -18 D. or -19 D.

L. V. $= \frac{20}{200}$ with -18 D. or -19 D.

Retinoscopy and direct observation with ophthalmoscope showed between -18 D. and -20 D. myopia.

Both lenses being slightly cataractous, I felt justified in removing them by solution.

Left eye.—After five needlings the pupil was quite clear, August 19th, 1893. I then found—

$$\text{L. E.: V.} = \frac{20}{50} \text{ with } \frac{+1{\cdot}5 \text{ D. s.}}{+0{\cdot}75 \text{ D. c. axis vert.}}$$

Reads J. 8 at 8″.

,, J. 1 at 2″.

Ophthalmoscope and retinoscopy showed the same.

On September 15th patient noticed a sudden dimness in the sight of the L. E., and vision dropped to p. l. Retina found to be detached in large folds.

Right eye.—After four needlings pupil was quite clear, February 7th, 1894. Vision at present, December, 1894

$$= \frac{20}{40} \text{ well with } \frac{+1{\cdot}5 \text{ D. s.}}{+1 \text{ D. c. ax. } 45^\circ}$$

$$\text{and J. 2 with } \frac{+4{\cdot}5 \text{ D. s.}}{+1 \text{ D. c. ax. } 45^\circ} \text{ at } 9''.$$

Retinoscopy and direct observation with ophthalmoscope show H. 1·5 D. and 2·5 D.

Query. Are we to conclude that the lens had a refracting value of 20·5 D. in its normal position, or has the shape of the eye changed?

(*Card specimen. December 13th*, 1894.)

6. *A case of enophthalmos becoming exophthalmos on stooping.*

By E. Treacher Collins.

Joseph B—, a clerk, aged 17, came as an out-patient to Mr. Couper at the Moorfields Hospital on November 11th, 1894, complaining that "on stooping his left eye seemed to give and bulge out;" also of twitching of the eyelids, the upper more than the lower. He had noticed these symptoms for about a year; previous to that time he had found nothing wrong with his eyes.

He had a not very severe blow on the top of his head from a cricket ball five years ago. From childhood up to two years ago he was subject to attacks of bleeding from the nose, which were always easily arrested by syringing cold water through the nostril. He has never had any serious illness, nor has he at any time suffered from any noises in the head.

On standing erect his left eye is seen to be less prominent than his right; it appears sunken in the orbit. On stooping for about a minute the left eye becomes projected forwards, so as to be more prominent than the right, which does not alter in position. After stooping the upper lid is found to droop completely over the cornea, so that he says on stooping the sight of his left eye goes. Occasionally the upper lid is noticed to twitch several times before regaining its normal position. The right eye gradually sinks into the orbit again on his standing up.

Both pupils react normally to light and accommodation. The movements of both eyes are normal.

V. = R. $\frac{6}{6}$, Hm. 0·75 $\frac{6}{6}$. J. 1. L. $\frac{6}{6}$, Hm. 0·75 $\frac{6}{6}$. J. 1.

No tumour or abnormal pulsation can be felt in the left orbit; the left eye offers less resistance on pressure back into the orbit than the right.

On ophthalmoscopic examination of the left eye, after

the patient has been stooping, the retinal veins are seen to be engorged, and there is marked pulsation of them.

No pathological changes are seen in the fundus of either eye.

The most probable explanation of this very remarkable case which suggests itself, is, that some form of vascular new growth is present in the orbit, the turgescence of which when the patient stoops causes the protrusion forwards of the eyeball. Its sunken condition when he stands erect may be the result of absorption of orbital fat due to pressure of the growth.

(*Card specimen. December 13th*, 1894.)

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7. *Double enophthalmos.*

By A. Stanford Morton.

James C—, æt. 40, was admitted as an out-patient at Moorfields under the care of Mr. Morton.

History.—On December 25th, 1894, patient was thrown out of a dray into the road at Christchurch, New Zealand. He fell upon his face, but says he did not lose consciousness; the nose was much cut, but there was no bleeding from the ears. He was treated in hospital for about four months, and states that the eyes were very bloodshot. There was no sinking of the eyes in the sockets previous to the accident, and the sight was good.

Present state.—The whole contour of the face is very much flattened. On closing the mouth the teeth of the lower jaw project in front of those of the upper (this was not the case before the accident), probably due to displacement backwards of the upper jaw: there is no evidence of fracture of the lower jaw.

The eyes are very much sunken in the sockets, the left rather more than the right; the left palpebral fissure

is smaller than the right. Both pupils are irregular, and about 5 mm. in diameter; numerous posterior synechiæ are present, and reaction either to light or accommodation is lost. The irides are discoloured, and are retracted at their pupillary edges. There is also epiphora. The movements of the eyes are impaired in all directions, but rather more in the vertical than in the horizontal plane. There is only a dull fundus reflex below; the rest of the fundus of both eyes shows a grey reflex of detached retina.

R. T. – 2. L. T. – 3.

R. V. = Hand reflex down and out.

L. V. = No p. l.

(*Card specimen. July 5th*, 1895.)

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8. *Ophthalmoplegia externa without other symptoms.*

By C. E. Beevor.

Elizabeth A—, æt. 35, married. Previous health good. Has had only one child, still-born. Ten years ago she had the "blight" in her eyes, and soon after it she noticed that the upper lid of each eye drooped, but she has never noticed that she had any difficulty in moving the eyes.

In December last she brought her father as a patient to the National Hospital for the Paralysed and Epileptic, Queen Square, without any idea of advice for herself, and it was there noticed that the eyes did not move, but how long this had existed it was not possible to say.

At present she has ptosis of both upper eyelids, the eyes being half closed, and on looking upwards there is hardly any movement, though the frontalis muscle overacts. The movements of the eyes are almost *nil*, but on looking up and down there is a very slight excursion of the

globes ; there is also slight movement laterally. The loss of movement affects both eyes equally, and the axes are kept parallel. On looking at a near object convergence is absent or very slight. Both pupils are equal, and react to light and to accommodation. The orbicularis palpebrarum on either side is very weak, so that when she closes the eyelids tightly the upper lids can be raised partially with very little force ; these muscles react normally to faradic and galvano-electric currents. The rest of the face muscles react normally.

Vision : R. = J. 1. L. = J. 2.

The knee-jerks are normal, and there are no symptoms of locomotor ataxia or of general paralysis.

This case is the second of the kind which I have shown to the Society, occurring in a woman who came to the hospital as a friend, and who did not know that the eyes were fixed, and that she moved her head in place of her eyes on looking to one side. Most cases are associated with locomotor ataxia or general paralysis. In the present case it seems possible from the family history that it might be specific. The lesion is considered to be a slow degeneration in the nuclei of the third nerves, and in connection with this the weakness of the orbicularis palpebrarum is of great importance, as from experiments of Mendel this muscle is considered to get its motor nerve supply through the facial nerve from the nucleus of the third nerve, and not from the facial nucleus. Hence in this case, this muscle being the only one of the facial muscles affected along with the muscles of the eyeball, would be strong evidence of the lesion being in the third nuclei.

(*Card specimen. June 13th*, 1895.)

9. *Cholesterine in the anterior chamber.*

By Gustavus Hartridge.

J. R. S—, æt. 24. In 1879 was playing with a pair of scissors, when accidentally he ran them into the right eye. He attended the Royal Westminster Ophthalmic Hospital, and a note was then made of a linear wound running vertically across the right cornea, together with a wound of the lens.

Present condition.—The right eye is rather injected and somewhat shrunken; the iris and anterior surface of the lens are sprinkled over with cholesterine, and there is an accumulation of the same material at the lower part of the iritic angle. There is a vertical nebula in the cornea.

(*Card specimen. March 14th,* 1895.)

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10. *Cholesterine in the subretinal fluid of a detached retina in the eye of an infant removed for buphthalmos.*

By Messrs. Hartridge and John Griffith.

Beyond the enormous size of the cornea, which retains its natural contour, there is not much, if any, increase in the dimensions of the eyeball. The lens and ciliary body show the changes liable to be met with in such eyes, and which may be considered peculiar to cases of congenital buphthalmos. The lens fibres are represented by a reticular or spongy network of homogeneous material, whereas the capsule is considerably and extensively thickened in front by the growth of a fibro-cellular tissue allied to that seen in anterior polar cataract. Behind, the capsule differs from the normal in possessing

an epithelial lining. Adherent to its posterior surface and traceable backwards towards the disc is some fibro-cellular tissue, embedded in a consolidated mass of detached retina folded up immediately behind the lens; this tissue is possibly the remains of the hyaloid artery. The ciliary processes are elongated to a marked extent. The subretinal effusion is fibrinous in character, and densely infiltrated with cholesterine crystals. The cornea shows microscopically nothing abnormal, but the iris is adherent to its periphery, closing the iris angle.

(*Card specimen. March 14th*, 1895.)

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11. *Sarcoma of anterior part of the brain, with extension by small projections through the skull, so connecting it with a large tumour outside the skull.* (*Model and microscopic specimen of the tumour.*)

By W. J. Cant (Lincoln).

A. C—, æt. 27, married, of good family and personal history with the exception of sore throat seven or eight years ago. Had influenza in January, 1894. Immediately afterwards she complained of dimness of sight, flashes of light, and specks in front of the eye, with occasional sickness and headache. On ophthalmoscopic examination she was found to have very marked double optic neuritis. At the end of May a small lump appeared at the top of the head, which gradually increased to about the size of an orange, and became fluctuating. Sense of smell was lost for two months. She complained of general feebleness, and there was loss of patellar reflex. She was treated by iodide of potassium (35 grs. t. d. s.) and Ung. Hydrarg. by inunction, without any improvement. She became totally blind, first in the right eye, and the optic nerves atrophied. The tongue was protruded to the right early in August. She could move all her limbs up to the last

week of life, but had no power of turning over in bed for some time before death. Temperature was normal up to the last three days. She died November 15th, 1894.

Post-mortem.—Large tumour beneath the scalp extending towards the right side, and lying over the frontal and parietal bones. It was found to consist of a nearly colourless, semi-fluid mass. On removing the calvarium the inner surface of the bone presented a large number of small perforations, leading to the superficial tumour, and plugged with delicate processes of the growth. The dura mater was not adherent to the bone, but to the brain surface; it was perforated by the processes before mentioned, but otherwise was healthy. The anterior part of the right side of the brain, and extending into the left side, was occupied by a large tumour, originating probably in the right frontal convolution. The lateral ventricles were distended with fluid. The microscopic section showed the tumour to be a soft sarcoma composed of round and oval cells.

(*Card specimen. December 13th*, 1894.)

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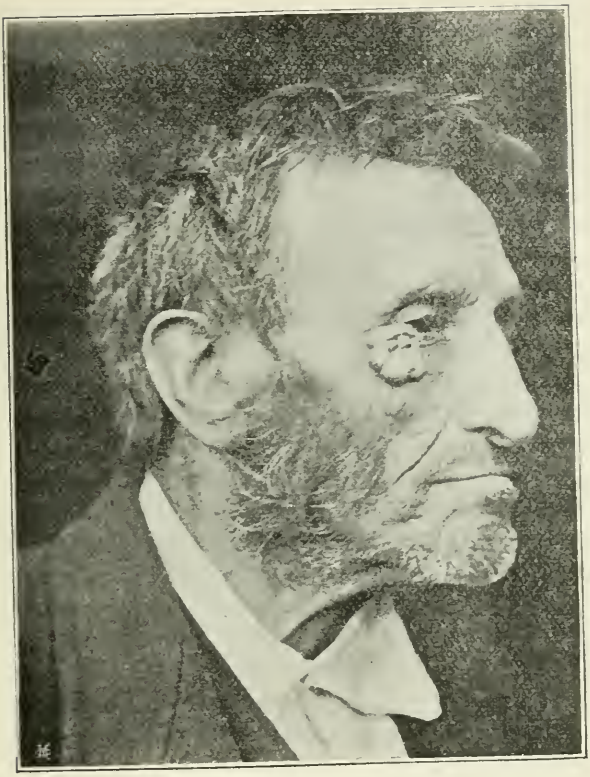
12. *Tumour of right malar region.*

By A. Stanford Morton.

George L—, æt. 77, presents a tumour over the right malar region. It has existed for three years, and is said to have been started by a blow. It is about one inch in diameter, roughly circular, with a smooth, rounded, overhanging lobulated margin projecting nearly ¼ inch (Fig. 26). The surface inside the raised periphery is more or less covered with crusts, underneath which is a raw surface, and some thin semi-purulent discharge. The whole is very superficial, and freely moveable with every contraction of the orbicularis. The margins are composed of soft lobules covered by healthy skin, and there is no induration.

FIG. 26.



There is very slight enlargement of the right pre-aural gland.

(*Card specimen. May 2nd*, 1895.)

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13. *Rodent ulcer.*

By A. STANFORD MORTON.

THE section shown under the microscope is taken from the patient who was present at the last meeting of the

Society (see Fig. 26), G. L—, æt. 77, a patient at Moorfields Hospital.

The growth below the right outer canthus was first noticed three years ago. It commenced as a small wart, and has since been growing. It is said to have been lanced several times, but little or nothing came from it.

May 3rd, 1895.—The growth was removed and after hardening in Hydrarg. Perchlor. and alcohol, portions were embedded in paraffin, and sections stained in logwood and eosin.

Microscopic examination.—The growth consists of masses of epithelium, which are arranged in clumps of various sizes and shapes. The cells are spheroidal, having each a large nucleus with but little cell protoplasm.

There are but few well-formed vessels, but there are numerous spaces which are evidently blood-channels. The ground substance is composed of loose connective tissue with infiltration of small round cells. The growth is one of that variety of epitheliomata usually termed "rodent ulcer."

(*Card specimen. June 13th,* 1895.)

XIII. INSTRUMENTS.

The Indian oculist and his equipment.

By Surgeon-Capt. H. E. Drake-Brockman.

The Indian oculist, or "sŭttiah," as he is called in India, is always a member of the caste known as Kayasth ; a caste whose members are, as a rule, well educated, and go in for clerking work a good deal. The craft of the sŭttiah is more or less a secret one, the knowledge of which is usually handed down from father to son, from generation to generation ; and needless to add that its performance is intimately mixed up with deceit and fraud of the grossest description, just compatible with the inclinations and morals of this particular caste. The accompanying set of instruments and outfit of the sŭttiah* were procured by me with great difficulty, and after a prolonged effort to obtain them, in which I have been engaged for months, and in which I ultimately succeeded only as a matter of chance more or less.

A patient was brought by his relations to me one day recently at the hospital under my charge, suffering from very severe and recent panophthalmitis, which from examination I was morally certain was the result of an operation for cataract performed by a sŭttiah ; this surmise turned out to be correct on inquiry from the relatives who accompanied him.

I have had the steps of the operation described to me in detail by a well-known sŭttiah, to whom the instruments sent belonged. To begin with, it is hardly neces-

* These were presented to the Society.

sary to mention the fact, viz. that there is absolutely no attempt at antisepsis of instruments, patient's eyes or face, or operator's hands, before the performance of the operation, and the same instruments are often used consecutively on several patients without much attempt at even ordinary cleanliness; small wonder is it, then, that an eye seldom escapes destruction of its sight or globe itself.

The operation is performed in the following way:—The patient's lower eyelid is everted by pushing down with a finger of the left hand, at the same time a little pressure is brought to bear on the globe by the same finger, in order to steady it during the introduction of the lancet; the next stage of the proceedings is the making of the incision into the eyeball; this is done by quickly piercing the sclerotic with a small lancet (No. 2 in set of instruments) close to the cornea in the lower and outer quadrant. It will be noticed that the tip of the lancets are carefully wrapped up with cotton at about $\frac{1}{8}$ inch from the tip, so as to prevent the sudden and excessive introduction of the instrument into the eyeball.

It will be noticed that this incision is made in dangerous proximity to the ciliary region, and that the introduction of the cataract needle into the eyeball at this point must damage this region when the next part of the operation is taken into consideration; this consists in the passing of the needle (Nos. 3, 4, or 5) for the purpose of couching or depressing the lens. The needle having been once passed within the eyeball into the vitreous, a series of motions of the hand are made from the position on first introduction of the needle to a point corresponding to it in the upper section of the outer diameter of the eyeball. Should the patient not see at once after the depression has been done, the motion is continued till the lens is well depressed from the pupillary area, and the latter is clear; this having been effected, the needle is withdrawn from the eyeball, and the patient's eye bandaged (this is *not always* done).

One more point of interest in this matter requires notice. On the completion of the operation the sŭttiah displays to the duped patient and his friends a small piece of membrane called "jhili" (No. 16), which before commencing the operation he has thrown into water, unnoticed, in order that it may unfold, and appear otherwise natural and fresh; this the unfortunate victim is made to believe is the actual cataractous lens which has been extracted. Different coloured specimens are kept in stock in order to prevent detection of the fraud by the people.

The remainder of the work to be done by this impostor is to extort money from his victim or his friends, failing which he annexes as much of the patient's property as he can, and then the sŭttiah makes himself very scarce, repairing to a distance as far away as possible, taking good care not to leave his address behind him!

The needles sent I obtained after a great deal of difficulty, as they are *boná fide*, have actually been in use for years, and have been instrumental in the destruction of hundreds of eyes and eyesight, having belonged to old sŭttiahs, who have been carrying on their work of destruction for years. It will also be observed that the needles are made of copper, and are very rough and unfinished. Two of them are covered with twisted cotton from a certain distance from the point, to allow of a firm hold as well as to prevent them from penetrating into the eyeball too far on introduction during the operation.

There are a number of other instruments sent, as well as drugs, all of which are used by sŭttiahs, but require little notice here more than that already given in the attached list.

The numerous powders, &c., sent are all drugs used by sŭttiahs in treating eye disease, usually first triturated, and then made into paste with water and smeared on the eyelids.

The whole thing from beginning to end is one of charlatanism and deceit of the worst description, and yet, in

the present unsatisfactory state of our legislation, these impostors are allowed to wander broadcast over the length and breadth of the country, inflicting suffering and misery, and openly deceiving the ignorant people of this country (as the greater part of their work is confined to the ignorant agricultural classes living in villages), without the least fear of being brought to book for their evil deeds! It seems strange, but, nevertheless, sadly true, that it has come even to my lot to see numbers of human beings whose eyesight has been totally destroyed by these charlatans, and a large number of eyes in which I have operated for relief from glaucoma, which has supervened as the natural course of events after operation by the sŭttiah. Such a state of affairs is scarcely to be wondered at when we consider for a moment the whole *modus operandi* of the sŭttiah, the actual damage which must be done to the ciliary region and to the vitreous by the movements of the clumsy needle used, and the amount of displacement and confusion of the contents of the eyeball entailed during the course of this crude form of "couching" the lens, leaving aside the additional danger of the dislocated lens being left inside the eyeball.

(*July 5th*, 1895.)

Dr. Drake-Brockman mentioned that the donor of the instruments was his nephew, and he congratulated him upon having been able to procure these instruments. During upwards of twenty-two years of experience in India he himself had failed to get possession of such a set, possibly because he had always tried persuasion. The instruments were apparently the same in Northern as in Southern India, and the traditions regarding the native oculists were the same all over the country, viz. because one's father was an oculist, therefore the son or sons must be oculists. The craft was secret, and was handed down in an hereditary manner. These very instruments had probably been handed down from father to

son for an indefinite period, and there was no telling how old they might be. He said that the operation, as performed by the sŭttiah, was probably not successful in more than 10 per cent. of the cases in restoring vision, *i. e.* permanently good vision. These oculists get hold of an old person, no matter what the cause of the blindness, it might even be due to an affection of the optic nerve, and the operation of couching is performed. They are only acquainted with this one operation. They usually require a small payment before commencing the operation; they then cover the head with a cloth, and the operation is done in darkness. As soon as the operation is completed the cloth is removed, and the patient asked whether he can see, and when a satisfactory answer is obtained they beat a hasty retreat. They travel from station to station, and he was constantly coming across their results in the shape of acute inflammation or panophthalmitis leading to total destruction. In others chronic glaucomatous conditions supervene, resulting in complete loss of vision. He thought the Society was to be congratulated upon the possession of these instruments. Had the instruments been produced at the recent trial of the gang of Indian oculists in London, it might have materially influenced the result.

Mr. Lawford pointed out that the instruments used by the Indian oculists in question had been produced in court, and they were much inferior to those which had just been shown to the Society.

APPENDIX.

The following Papers and Card Specimens were also brought before the Society during the Past Session.

Drawings of (1) sclerosis of cornea, (2) sarcoma of orbit, (3) luxation of crystalline lens.
KENNETH SCOTT (October 18th, 1894).

Associated movement of upper eyelid and lower jaw.
WILLIAM LANG (October 18th, 1894).

Congenital coloboma in macular region.
Transverse films of corneæ.
N. C. RIDLEY (December 13th, 1894).

Benno's writing-paper for the blind.
A. BRONNER (December 13th, 1894).

Congenital lens opacity.
H. WORK DODD (December 13th, 1894).

Associated movements of eyelids and mouth.
CHARLES WRAY (December 13th, 1894).

Improved test types.
SYDNEY STEPHENSON (March 14th, 1895).

Wire eye-shields for use after cataract operations.
A. BRONNER (March 14th, 1895).

New operation for the relief of ptosis (see 'Trans. 8th Internat. Ophth. Congress, Edinburgh,' 1894).
P. H. MULES (May 2nd, 1895).

Disease of retinal arteries.
R. W. DOYNE (June 13th, 1895).

Epithelioma of cornea and conjunctiva.
Coloboma of iris and choroid.
H. SECKER WALKER (June 13th, 1895).

Modification of Thompson's arrangement of Holmgren's wools. H. E. CARTWRIGHT (July 5th, 1895).

REPORT OF COUNCIL

Read at the Annual General Meeting of the Society, July 5th, 1895.

The Council is glad to be able to record the continued progress and prosperity of the Society during the past year. The number of members continues to increase, and the roll now reaches 321, including 20 new members elected during the present Session.

The Society has lost by death one of its most distinguished members in Mr. J. W. Hulke.

Mr. Hulke was an original member of the Society, and from its commencement took an active share in its proceedings. He followed Mr. Jonathan Hutchinson as President in the year 1886, and was twice elected Vice-President.

Mr. Hulke was a man of great learning and attainments, and of the highest integrity and strength of character. At the time of his death, as is well known, he had reached that position as President of the Royal College of Surgeons to which his eminence both in surgery and ophthalmic science justly entitled him. The Society will greatly feel the loss of a man of whom the profession was rightly proud.

The Council has further to deplore in common with the whole scientific world the death of that brilliant scientist Professor Helmholtz of Berlin. His great discoveries lie at the foundation of the present position and much of our present knowledge of ophthalmology. It is

appropriate that in this place the council should briefly express on behalf of the Society and of ophthalmic science its great indebtedness to his genius and its sense of loss at the removal from the roll of their honorary members of the illustrious name of Professor Helmholtz.

Three members of the Society have resigned, amongst whom is Dr. Bristowe. The Council regrets that he has felt obliged, on account of the state of his health, to sever his connection with the Society. The Council has nominated him for an honorary member. One member has been removed from the list of members by the Council as he has not been heard of for several years.

An important event of the year and in the history of the Society is the conclusion of a new and satisfactory agreement with the Medical Society, by which, in addition to the previous clauses relating to the meeting-rooms, the Council has obtained for members of the Society the exclusive use of one room to serve as a library during the day-time, and on such *evenings* as it may be required, for their meetings. This marks a step in the progress of the Society, which may now be said to have a permanent home.

The room has been furnished by the Council as a library and reading-room, and fitted with electric light and the newest ophthalmological appliances for the examination of cases at the Society's meetings. Ample space is also afforded for the library of the Society for some years to come. In the daytime the room is now open to members who choose to avail themselves of it between the hours of 1 and 6 p.m., except on Saturdays, when it is open from 1 to 3 p.m.

This new arrangement with the Medical Society has entailed considerable expense, especially with regard to the fitting and furnishing of the library. The Council is, however, glad to state that in spite of this drain upon its funds, the condition of the finances of the Society as compared with previous years and as presented in the Annual Balance Sheet is thoroughly satisfactory.

The Bowman Lecturer for this year was Dr. Gowers, who was prevented by illness from being present. His able lecture on Subjective Visual Phenomena was, however, delivered by his proxy, Dr. Risien Russell.

The time having now come to give effect to the decision of the Society to limit the term of office of President to two years, the Council now suggests that Rule 14 be altered in accordance with the resolution adopted by the Society on July 7th, 1893.

The Council therefore recommend the following alterations of Rule 14:

In line 8 to insert the words, "The President shall not hold office for a period of more than two consecutive years," preceding "No;" and following "No" to insert the word "other."

The Council gratefully acknowledges the presentation of books and pamphlets from the following gentlemen:— The Editors of the Transactions of the 8th Ophthalmological Congress, Dr. Gowers (a book and drawings), Dr. C. E. de Schweinitz, Surg.-Capt. Maynard, Mr. Morax, Dr. W. G. Pym, Mr. Snell, Dr. Swanzy, Dr. Tscherning, and Mr. Tweedy. Also instruments from Mr. E. Drake-Brockman.

ACCOUNT OF RECEIPTS AND PAYMENTS, 1894–5,
OF THE
OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Receipts.

	£	s.	d.
To Balance at Bankers, June 20th, 1894	337	14	10
,, Subscriptions:			
1892–3 £1 1 0			
1893–4 29 8 0			
1894–5 208 0 6			
,, Entrance Fees (17) 17 17 0			
,, Composition Fees (14) 111 6 0			
	367	12	6
,, The Trustees of the late Sir Wm. Bowman	50	0	0
,, Sale of old Case	10	10	0
,, Sale of 'Transactions'	45	10	0
,, Dividends (four quarters)	13	5	0

Investments:

	£496 8 6	Consols.
1894–5—	88 18 8	
	£585 7 2	

	£824	12	4

Payments.

	£	s.	d.
By Bankers' Charges	0	4	1
,, Adlard and Son:			
Printing Vol. XIV of 'Transactions' £96 8 0			
Other printing 35 10 0			
	131	18	0
,, Illustrations for Vol. XIV	63	10	6
,, Library	25	0	0
,, Rent to March 25th, 1895	67	15	0
,, Furnishing New Library	83	9	10
,, Electric Lighting, Lamps, &c.	33	16	0
,, Law Charges	2	2	0
,, Assistant Librarian and Refreshments at Meetings:			
1893–4 £19 6 6			
1894–5 20 5 8			
	39	12	2
,, Lamps and Sundry Expenses at Meetings	5	18	6
,, Dr. Gubb—Reporting at Meetings and Expenses	13	5	6
,, Secretaries' Expenses	2	0	2
,, Purchase of £88 18s. 8d. Consols	90	19	0
,, Balance at Bankers, June 19th, 1895	265	1	7
	£824	12	4

(Signed) GEORGE COWELL, *Treasurer.*

Examined and found correct. (Signed) { DONALD GUNN, GUSTAVE SCHORSTEIN, } *Auditors.*

INDEX.

PAGE

Acromegaly, optic atrophy in 133
Alveolar sarcoma of cornea 90
Ankyloblepharon, complete 49
Antitoxin treatment in membranous conjunctivitis . . 55
Appendix 254

Beevor (C. E.), ophthalmoplegia externa without other symptoms 242
Bickerton (T. H.), remarks on eyesight tests in the public services 205
Blood pigment in cornea . . . 69, 86
Bowman lecture 1
Brailey (W. A.), the iritis of the later stages of syphilis . 93
Bronner (Adolph), remarks on chancre of eyelids . . 47
Bruce (Alex.) report on case of filaria loa . . . 154

Campbell (E. Kenneth), horizontal equatorial rupture of choroid 126
Cant (W. J.), sarcoma of anterior part of brain, &c. . 245
Cargill (Vernon), remarks on formol . . . 232
Cataract, coralliform, with crystals in the lens . . 119
—— double anterior polar 196
—— lamellar, peculiar variety of 119
—— —— showing symmetrical markings . . . 120
—— —— and rickets 104
—— traumatic, with foreign body in lens . . . 115
—— secondary zonular, and coloboma lentis . . 121
Caterpillar hairs in conjunctiva, &c. . . . 211
Cellulitis of orbit, plastic 185
Chancre of eyelids and conjunctiva . . . 39
Cholesterine crystals in the lens 117
—— —— cataractous lens 118
Cholesterine in the anterior chamber . . . 244
—— in subretinal fluid in buphthalmos . . . 244

PAGE
Choroid, horizontal equatorial rupture of . . . 126
Clarke (Ernest), pulsating exophthalmos (congenital) . 198
Collins (E. Treacher), case of enophthalmos becoming exophthalmos on stooping 240
—— description of alveolar sarcoma of cornea . . 91
—— lamellar cataract and rickets . . . 104
—— discoloration of cornea with blood pigment . . 69
—— polycoria with deep pitting of the optic disc . . 192
Collins (W. J.), see *Watson, W. Spencer*
Coloboma of lens 121
Conjunctiva, chancre of 39
—— osteoma of 51
—— pemphigus of 68
Conjunctivitis, membranous 55
Cornea, alveolar sarcoma of 90
—— blood-staining of 69, 86
—— marginal ulceration and bullæ of . . . 92
—— tuberculous disease of 87
Critchett (Anderson) remarks on plastic cellulitis of orbit . 190
—— remarks on eyesight tests in the public services . 204
Cyst, hydatid, of orbit 167

Dodd (H. Work), congenital pigmentation of retina . 194
Donaldson (E.), alveolar sarcoma of the cornea . . 90
Doyne (R. W.), optic atrophy in acromegaly . . 133
—— remarks on eyesight in the public services . . 205
Drake-Brockman (Surg. Capt. H. E.), the Indian oculist and his equipment 249
Drake-Brockman (E. F.) remarks on Indian oculists . 252
—— remarks on wound of lens, &c. . . . 117
Enophthalmos becoming exophthalmos on stooping . . 240
Enophthalmos, double 241
Epilepsy, visual aura in 8
Exophthalmos, pulsating 198
Eyelids, chancres of 39, 48
Eyesight and the public services 199

Fields of vision in acromegaly 134
—— —— in optic atrophy . . . 129, 132
Filaria loa, female, removal from skin of eyelid . . 162
—— male, removal of parasite from beneath conjunctiva . 137
Fischer (E. C.), marginal ulceration of corneæ, with bullæ . 92

PAGE
Fischer (E. C.) retinitis proliferans . . . 124
Formol as a hardening reagent for eyes and other tissues . 229

Gowers (W. R.), subjective visual sensations (Bowman lecture) 1
Griffith (A. Hill), remarks on chancre of eyelids . . 47
Griffith (John), remarks on cystic sarcoma of ciliary body . 181
—— report on case of tuberculous keratitis . . 89
—— specimens of blood-staining of cornea . . 86
Gunn (Donald), remarks on ophthalmia nodosa . . 223
—— tubercle of iris and ? cornea . . . 101
Gunn (R. Marcus), extreme congestion of optic discs in hypermetropia 136
—— peculiar coralliform cataract . . . 119
—— peculiar variety of lamellar cataract . . . 119
—— remarks on cholesterine crystals in lens . . 118
—— —— on the origin of lamellar cataract . . 113
—— result in case of pemphigus of conjunctiva . . 68
—— spontaneous symmetrical dislocation of both crystalline lenses 122
—— traumatic subluxation of lens, secondary zonular cataract, and coloboma lentis 121

Hæmorrhage from conjunctiva 64
Hartridge (G.), cholesterine in the anterior chamber . 244
—— osteoma of the conjunctiva 51
—— remarks on ophthalmia nodosa . . . 223
—— tuberculous keratitis 87
—— and Griffith (J.), cholesterine in the subretinal fluid in buphthalmos 244
Higgens (C.), remarks on iritis in the late stages of syphilis 99
—— —— on pulsating tumour of orbit . . . 191
Hodges (F. H.), and Ridley (N. C.), intra-ocular melanotic sarcoma 178
Hulke (J. W.), remarks on plastic cellulitis of orbit . 188
Hyaloid artery, persistent 195
—— —— —— and microphthalmos . . . 195
Hydatid cyst of orbit 167
Hypermetropia, congestion of optic discs in . . 136

Indian oculist and his equipment 249
Iris, new pigment spots on 103
—— sarcoma of 184
—— tubercle of 101, 102

PAGE
Iritis in the later stages of syphilis . . . 93

Jessop (Walter H.), hæmorrhage from conjunctival surface of upper lid 64
—— membranous conjunctivitis in which Loeffler's bacillus was found 55
—— new pigment spots on anterior surface of iris . . 103
—— primary sore on eyelids 48
—— remarks on blood-staining of the cornea . . 86
—— —— on iritis in the late stages of syphilis . . 100
Johnson (G. Lindsay), case of high myopia treated by removal of both lenses 239
—— lamellar cataract showing symmetrical markings . 120
—— remarks on formol 232

Keratitis, tuberculous 87

Lamellar cataract, peculiar variety of . . 119, 120
Lang (W.), cholesterine crystals in the lens . . 117
—— —— in cataractous lens 118
—— lenticonus posterior 122
—— remarks on iritis in the late stages of syphilis . . 99
—— —— on removal of lenses in high myopia . . 237
Lawford (J. B.), hydatid cyst of orbit, removal of cyst . 167
—— ophthalmia nodosa 210
—— peculiar coloured lenticular opacities, probably congenital 197
—— unusual arrangement of retinal vessels . . 195
Lawson (George), plastic cellulitis of orbit . . 185
Lens, foreign body in 115
—— traumatic subluxation of 121
Lenses, crystalline, spontaneous symmetrical dislocation of . 122
Lenticonus posterior 122
Lenticular opacities, peculiar coloured . . . 197
Lids, primary sore on 48

Mackay (George), eyesight and the public services . . 199
Mackenzie (Stephen), remarks on eyesight and the public services 208
—— —— on the relation between rickets and lamellar cataract 111
Mackinlay (J. G.), remarks on membranous conjunctivitis . 63
Manson (P.), remarks on case of filaria loa . . 157

PAGE
Manson (P.), report on female filaria loa . . . 166
—— —— on structure of male filaria loa . . . 141
Marshall (C. D.), cystic sarcoma of the ciliary body . 180
—— formol as a hardening reagent for eyes and other tissues 229
—— ? gummatous growth in the eye . . . 183
—— tubercular growth in eyeball . . . 181
—— remarks on chancre of eyelids . . . 47
—— —— on lamellar cataract 113
Melanotic sarcoma, intra-ocular 178
Membranous conjunctivitis treated by antitoxin . . 55
Microphthalmos and persistent hyaloid artery . . 195
Migraine, visual spectra of 20
Morton (A. S.), double enophthalmos . . . 241
—— microphthalmos and persistent hyaloid artery . . 195
—— rodent ulcer 247
—— tumour of right malar region . . . 246
Myopia, extraction of transparent lenses in . 233, 239

Obscuration of vision in migraine . . . 29
Ogilvie (George), grey atrophy of the optic nerves with peculiar fields; obscure nervous symptoms . . 127
Ophthalmia nodosa 210
Ophthalmoplegia externa 242
Optic atrophy in acromegaly 133
—— discs, congestion of, in hypermetropia . . 136
—— nerves, grey atrophy of, with peculiar fields . . 127
Orbit, hydatid cyst of 167
—— plastic cellulitis of 185
—— pulsating tumour of 191
Osteoma of the conjunctiva 51

Parasitic diseases 137
Peculiar coloured lenticular opacities . . . 197
Pemphigus of conjunctiva, result of . . . 68
Peripheral colour vision 12
Pigmentation of retina, congenital . . . 194
Plastic cellulitis of orbit 185
Polycoria, with deep pitting of the optic disc . . 192
Power (Henry), remarks on pulsating tumour of orbit . 191
Preston (Fleet Surgeon), remarks on eyesight in the navy . 202
Public services, eyesight tests for 199
Pulsating exophthalmos 198

Removal of both lenses in high myopia . . . 239

PAGE
Report of council 255
—— of treasurer 258
Retina, congenital pigmentation of . . . 194
—— detachment of, with + tension . . . 125
Retinal vessels, unusual arrangement of . . . 195
Retinitis proliferans 124
Rickets and lamellar cataract 104
Ridley (N. C.), see *Hodges* (*F. H.*).
Robertson (D. Argyll), case of filaria loa in which the parasite was removed from under the conjunctiva . . 137
—— further note of a case of filaria loa . . . 162
—— remarks on hydatid disease of orbit . . . 175
—— —— on osteoma of conjunctiva . . . 55
—— —— on pulsating tumour of orbit . . . 191
Rockliffe (W. C.), remarks on hydatid disease of orbit . 176
Rodent ulcer 247

Sarcoma of anterior part of brain, &c. . . . 245
—— cystic, of the ciliary body 180
—— intra-ocular melanotic 178
—— of iris 184
Scott (Kenneth), complete ankyloblepharon . . 49
Silcock (A. Q.), anterior polar cataract with persistent pupillary membrane 196
—— anterior synechia of pupillary membrane (congenital) . 193
—— tuberculosis of iris and ciliary body . . . 102
Smith (Priestley), remarks on eyesight testing in the public services 204
Snell (Simeon), nine cases of chancre of the eyelids and conjunctiva 39
Snowball (W.), report on the character and distribution of rickets in Victoria 105
Stephenson (Sydney), remarks on case of hæmorrhage from conjunctiva 67
—— remarks on lamellar cataract . . . 112
Synechia, anterior, of pupillary membrane . . . 193
Syphilitic sores on eyelids . . . 39, 48

Taylor (James), remarks on case of optic atrophy . . 133
Taylor (Johnson), remarks on case of hydatid disease of orbit 176
Tests for eyesight in the public services . . 200, 209
Treasurer's report 258

PAGE
Tubercle of iris and ? cornea 101
Tubercular growth in eyeball 181
Tuberculosis of iris and ciliary body . . . 102
Tuberculous keratitis 87
Tumour of malar region 246
—— pulsating, of orbit 191
Tweedy (John), remarks on plastic cellulitis of orbit . 189

Ulcer, rodent, of skin of malar region . . . 247

Vernon (Bowater), pulsating tumour of orbit . . 191
Vision, centres of 6
Visual aura in epilepsy 8
—— sensations, subjective (Bowman lecture) . . 1
—— spectra in migraine 20

Walker (H. S.) sarcoma of iris 184
Watson (W. Spencer), remarks on iritis in the late stages of syphilis 100
—— remarks on transparent lenses in high myopia . . 236
—— and Collins (W. J.), traumatic cataract with foreign body embedded in lens 115
Wood (Jeffrey), statement concerning the prevalence of rickets in Victoria 107
Wray (Chas.) extraction of transparent lenses in high myopia 233
—— detachment of retina with + tension . . . 125

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